PB89-203947

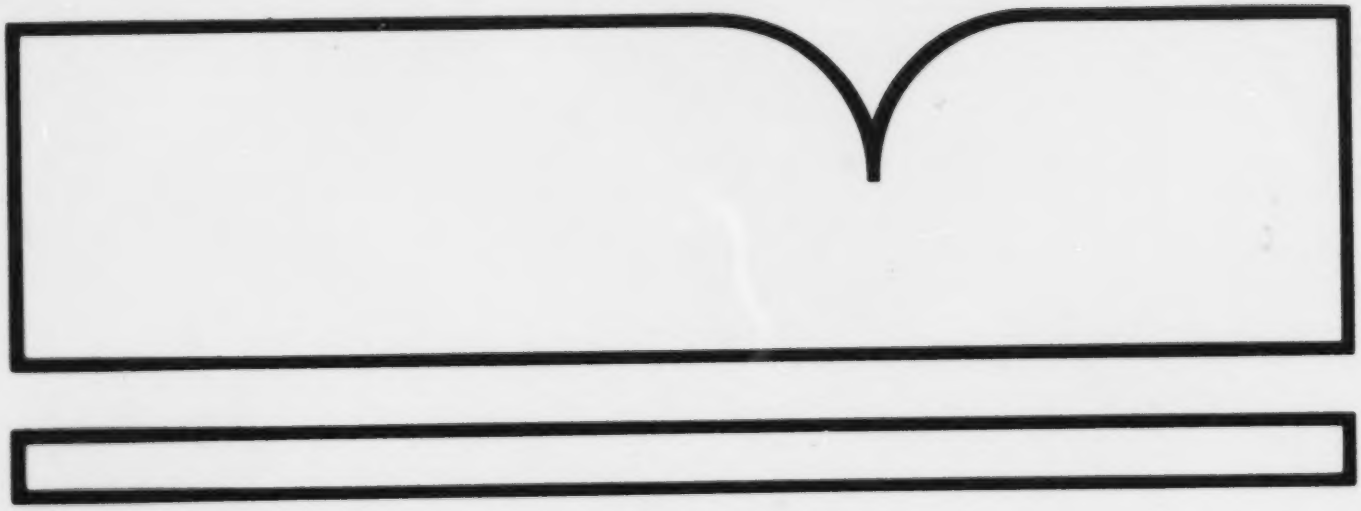
Wetlands in the Lake Champlain Region of Vermont: Present and Future Threats to the Resource. Boundary Determination and Background Information for the EPA's Proposed Advanced Identification

Yale Univ., New Haven, CT

Prepared for:

Environmental Protection Agency, Boston, MA

Nov 88



U.S. Department of Commerce
National Technical Information Service
NTIS

PB89-203947

Final.
a203-88

WETLANDS IN THE LAKE CHAMPLAIN REGION OF VERMONT: PRESENT AND FUTURE THREATS TO THE RESOURCE

Boundary Determination and Background Information for the EPA's Proposed Advanced Identification

prepared for

EPA Region 1 Wetlands Protection Section

by

M. Alisa Borre
Yale School of Forestry and Environmental Studies

November 1988

RECEIVED - EPA
NOV 29 1988
WATER QUALITY BRANCH

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL INFORMATION SERVICE
SPRINGFIELD, VA. 22161

*50272 - 101

REPORT DOCUMENTATION PAGE	1.REPORT NO. 600/9-89/049	2.	3. Recipient's Accession PB89 203947/AS
4. Title and Subtitle Wetlands in the Lake Champlain Region of Vermont: Present and Future Threats to the Resource			5. Report Date Completed Fall 1988 6.
7. Author(s) M. Alisa Borre, Graduate Student			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Yale School of Forestry and Environmental Studies Yale University Sage Hall 205 Prospect Street New Haven, CT 06511			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G) U-912-796-01-0
12. Sponsoring Organization Name and Address U. S. Environmental Protection Agency Office of Cooperative Environmental Management 499 South Capitol Street, SW A101-F6 Washington, DC 20460			13. Type of Report & Period Covered Technical Report 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

2203

This project is part of the National Network for Environmental Management Studies conducted under the auspices of the Office of Cooperative Environmental Mangement - U. S. Environmental Protection Agency. EPA Region I Wetlands Protections Section is planning an Advanced Identification Project for the Lake Champlain Region of Vermont. "Advanced Identification" refers to the two authorities EPA can utilize under Section 404 of the Clean Water Act to protect wetlands in advance of permit applications. In Vermont, a combined "activates-based" Advanced Identification of Sites (AIS) and Advance 404(c) project is proposed.

This study determines the boundaries for the Advanced Identification action. It discusses the criteria developed to evaluate watershed considerations and both present and future threats to the resource. All towns in four counties bordering Lake Champlain were evaluated with regard to location in watershed, wetland acreage, wetland loss, population projections, historical growth trends, tax information, and housing stock estimates. Wetland loss in Vermont is incremental, increasing, and is concentrated in the Lake Champlain region, especially in Chittenden County, one of the fastest growing counties in the nation.

A twenty-six town area, mostly in Chittenden County and adjacent lakeshore communities, has been proposed for an "activities-based" AIS. Based on the criteria listed above, the towns selected are experiencing the types of growth pressures that will lead to continued wetland loss. EPA plans to restrict work at especially valuable sites with this area using Advance 404(c).

17. Document Analysis a. Document Descriptors

b. Identifier's/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) Unclassified	21. No. of Pages
	20. Security Class (This Page) Unclassified	22. Price

(See ANSI-Z39.18)

OPTIMAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

Disclaimer

This report was furnished to the U. S. Environmental Protection Agency by the graduate student identified on the cover page, under a National Network of Environmental Policy Studies fellowship.

The contents are essentially as received from the author. The opinions, findings, and conclusions expressed are those of the author and not necessarily those of the Environmental Protection Agency. Mention, if any, of company, process, or product names is not to be considered as an endorsement by the U. S. Environmental Protection Agency.

2203

Threats to Wetlands in the Lake Champlain Region of Vermont: Boundary Determination for EPA's Proposed Advanced Identification

by M. Alisa Borre

Executive Summary

EPA Region 1 Wetlands Protection Section is planning an Advanced Identification project for the Lake Champlain Region of Vermont. "Advanced Identification" refers to two authorities EPA can utilize under Section 404 of the Clean Water Act to protect wetlands in advance of permit applications. In Vermont, a combined "activities-based" Advanced Identification of Sites (AIS) and Advance 404(c) project is proposed.

A study was conducted to determine the boundaries for the Advanced Identification action. This report discusses the criteria developed to evaluate watershed considerations and both present and future threats to the resource. All towns in four counties bordering Lake Champlain were evaluated for: location in the watershed, wetland acreage, wetland loss, population projections, historical growth trends, tax information, and housing stock estimates. Wetland loss in Vermont is incremental, increasing, and is concentrated in the Lake Champlain region, especially in Chittenden County, one of the fastest growing counties in the nation.

A twenty-six town area, mostly in Chittenden County and adjacent lakeshore communities, has been proposed for an "activities-based" AIS. Based on the criteria listed above, the towns selected are experiencing the types of growth pressures that will lead to continued wetland loss. EPA plans to restrict work at especially valuable sites within this area using Advance 404(c).

SUMMARY

In 1988, estimated annual wetland loss in Vermont was greater than 200 acres (a rate equal to 1 percent a year). Wetland loss in the state is incremental with hundreds of projects involving small wetland areas accumulating over time. The amount of projects involving wetland loss is increasing and is concentrated in the Lake Champlain region, especially Chittenden County where rapid growth pressures threaten valuable wetlands.

Since June 1988, EPA Region 1 Wetlands Protection Section has been working closely with the Vermont Department of Water Resources and the Vermont Natural Heritage Program planning an Advanced Identification project for this region. "Advanced Identification" refers to two authorities EPA can utilize under Section 404 of the Clean Water Act to protect wetlands in advance of permit applications. In Vermont, a two-phase project has been proposed. EPA envisions utilizing both the Advanced Identification of Sites (AIS) authority pursuant to Section 230.80 of the 404(b)(1) guidelines and the Advance 404(c) authority pursuant to Section 404(c). The combination of these authorities will provide a mechanism to address cumulative impacts of wetland loss using a regional approach, and ultimately, will provide stronger protection to wetlands in the Lake Champlain Region.

This study provides the information necessary for establishing an Advanced Identification boundary. The boundary, designed to place an emphasis on problem areas, was based on watershed considerations and both present and future threats to the resource.

I. INTRODUCTION

Increasing population pressures and rapid development in Vermont threaten valuable wetlands. Statewide, Vermont's population is projected to increase 20 to 28 percent from 1980 to 2000 (Vermont Department of Health, 1983). This projected population growth will not be distributed evenly throughout the state--certain areas will experience more growth than others. For example, Chittenden County, one of the fastest growing counties in the nation, grew more than triple the absolute growth of any other county in the state from 1980 to 1985 (Vermont Office of Policy Research and Coordination, 1986). The population in Chittenden, Addison, Franklin and Grand Isle Counties, four counties that border Lake Champlain, will account for 45 percent of the state's population by the year 2000. Of the 220,000 acres of wetlands in the state (Tiner, 1987), nearly 40 percent are concentrated in these same four counties.

Although records of wetland loss are sparse, the trend appears to correspond closely with growth pressures. In 1987, estimated annual wetlands loss in Vermont was greater than 200 acres. State records from 1986 to 1988 indicate that annual loss is increasing and that loss is concentrated in the Lake Champlain region. Chittenden County accounts for almost 30 percent of the loss-related projects reviewed by the state wetlands office.

Wetlands are a vital part of the Lake Champlain resource and serve valuable functions including: fish and wildlife habitat, groundwater exchange, floodwater storage, shoreline stabil-

ization, sediment and nutrient retention, and aquatic productivity. Society also values wetlands for research, recreation, education, aesthetics and open space.

Since June 1988, EPA Region 1 Wetlands Protection Section has been working closely with the Vermont Department of Water Resources and the Vermont Natural Heritage Program to plan an advanced identification project for the Lake Champlain region. EPA's interest in this area was triggered by a Statement of Intent that the Natural Heritage Program submitted to EPA in February 1988, proposing an Advanced Identification and requesting support for such an effort. EPA conducted a preliminary investigation in cooperation with the State of Vermont to gather more information about wetlands in the Lake Champlain region and to determine the potential threats to the resource. The information has been used to define the boundaries for the proposed action and to make recommendations as to how the project should proceed.

The results of the preliminary investigation are presented in this report which is divided into the following sections: 1) an overview of EPA's Advanced Identification authorities, 2) discussion of criteria used to determine AIS boundary, 3) proposed Advanced Identification boundary, and 4) recommendations.

II. OVERVIEW OF EPA's ADVANCED IDENTIFICATION AUTHORITIES

The blanket term "Advanced Identification" refers to two authorities that can be used by EPA under Section 404 of the Clean Water Act. The first authority is described in Section 404(c) and has been termed "Advanced 404(c)." The second authority, Advanced Identification of Sites (AIS), also referred to as "Advanced Identification" is a planning tool described in Section 230.80 of the Section 404(b)(1) guidelines. Both the Advanced 404(c) and the AIS are intended to protect wetlands in advance of permit applications.

Advance 404(c)

Under Section 404(c) of the Clean Water Act (40 CFR 231), EPA may, after making certain findings, prohibit or restrict use of wetlands and other waters of the United States as disposal sites for dredged or fill material. Although this authority is usually thought of as a "veto" power over the Corps permits, it can also be used to designate areas in advance of any discharge proposal. EPA may use this authority only if it finds that a potential discharge would have unacceptable adverse effects on municiple water supplies, fish, shellfish, wildlife, or recreation. Advance 404(c) is different than AIS in that it involves legal restrictions.

Advanced Identification of Sites (AIS)

EPA's second authority, Advanced Identification of Sites (AIS), is a planning tool that allows EPA and the U.S. Army Corps of Engineers (Corps), in cooperation with state and local

authorities, to identify sites as being unsuitable (or suitable) for discharge of dredged and fill material. Again, this mechanism can be used prior to any application to the Corps for a 404 permit. Unlike Advance 404(c), an AIS designation does not prohibit or restrict work in a given area, but indicates in advance whether a permit application is likely to be approved or denied.

In 1987, EPA Region 1 performed an AIS action in York County, Maine and used a slightly different approach for the AIS. Rather than designating particular wetlands as being unsuitable for disposal of dredge or fill material, all wetlands in an 18 town area were designated as being unsuitable for non-water dependent activities. This "activities based" approach has the advantage of being able to cover a much greater area than either the site-specific AIS or an Advance 404(c). Either of these authorities can be used singly or in combination with each other.

Proposed Advanced Identification in Vermont

In Vermont, EPA envisions using a combination of the activities-based AIS and the advanced 404(c). The proposed two-phase project will include designating a relatively large Advanced Identification area (e.g. 20-30 towns) within which EPA would proceed to prohibit or restrict work at selected sites under Section 404(c). The broad-scale AIS will focus on educating the public about wetland values and the various federal and state regulations designed to protect wetlands. The advance 404(c) designation will protect especially valuable wetlands in

the AIS boundary. The specific objectives of the combined AIS/advanced 404(c) project include the following:

1. **Public Education**

   a. Increase public awareness of wetland values

   b. Improve public understanding of both state and federal regulatory requirements that pertain to wetlands.

   c. Decrease incidence of unauthorized work.

2. **Provide Information about wetland functions and values**

   a. Determining the values of various wetlands in advance will increase certainty and decrease the workload for both the government agencies at the permit review stage.

   b. Information about functions and values of wetlands in the Lake Champlain will allow government agencies to better address the cumulative impacts of wetland loss.

3. **Promote Planning**

   a. Warning people about which areas are considered significant under the state regulations and unlikely to receive federal permits will save potential developers time and money by planning environmentally acceptable projects that avoid these wetland areas.

   b. Focusing on the Lake Champlain region will promote an ecosystem-based approach to planning.

4. **Provide Stronger Protection**

   a. Provide strong protection to especially valuable and/or vulnerable wetlands in the target area with advance 404(c).

   b. The activities-based AIS should reduce the piecemeal loss of wetlands that individually may not seem important, but when considered in the larger picture, add up to significant wetland loss.

Presently, The State of Vermont is writing wetland rules and regulations to accompany the 1986 Vermont Wetlands Act (10 V.S.A. SS95). By late spring 1989, The Department of Water Resources expects to adopt the new rules which will establish criteria for significant wetlands and will prohibit or regulate certain activities in those wetlands. EPA intends for the proposed Advanced Identification project to be a complimentary action to the state program.

III. DISCUSSION OF CRITERIA USED TO ESTABLISH AIS BOUNDARY

A. Defining the Study Area

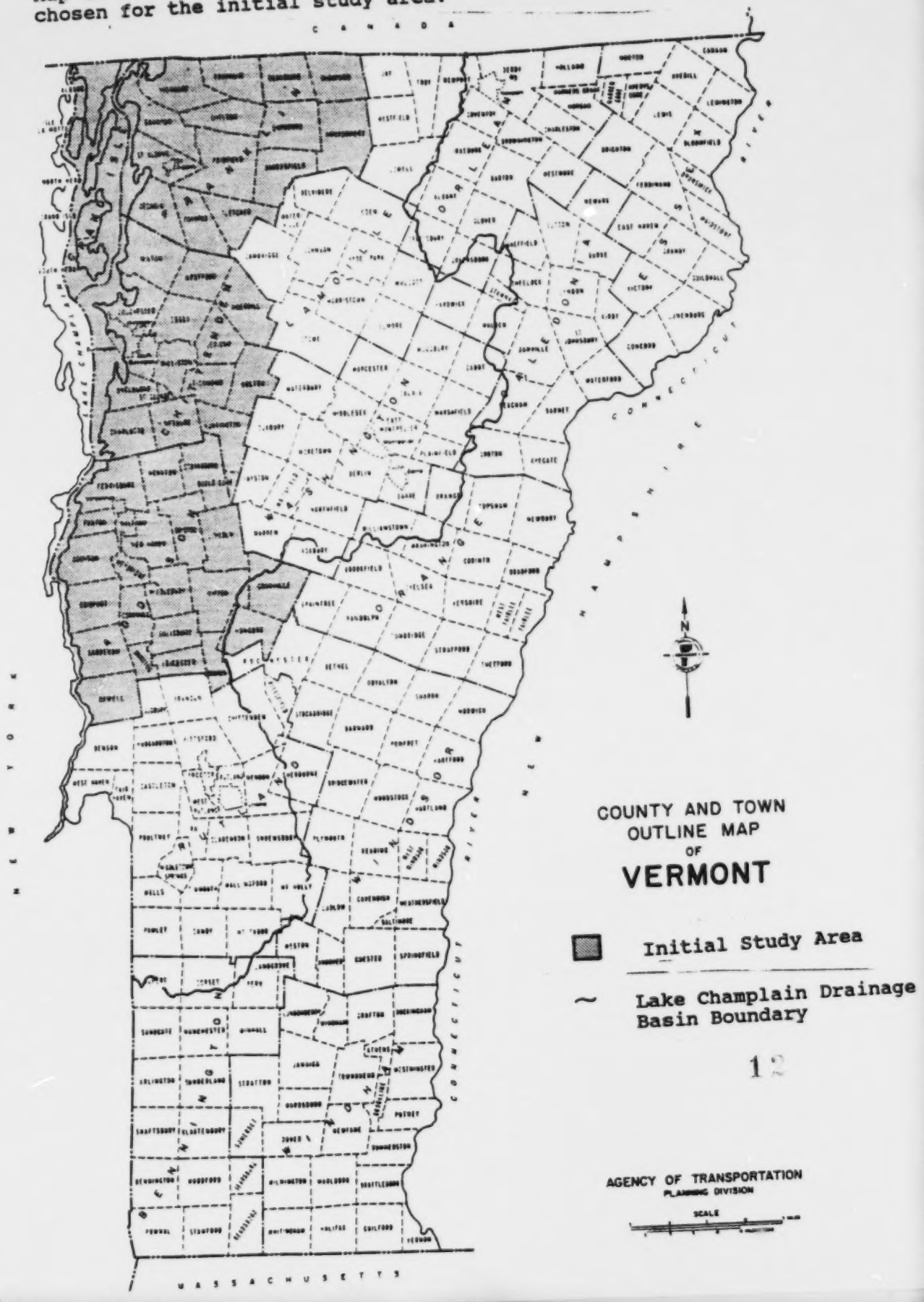
Background information gathering for the proposed Advanced Identification in Vermont centered around the two potential components of the project: 1) a broad-scale activities based AIS and 2) a site-specific advanced 404(c). Because Advanced Identification is designed to place more emphasis on problem areas, the first task was to define a geographical region for the AIS action. To be most effective, the geographic region should couple both value and vulnerability. That is, a boundary should be placed around an area that has valuable wetlands that are also vulnerable to the placement of dredged or fill material.

In defining the general study area, two possible boundaries were considered: 1) watershed boundaries and 2) political boundaries. For addressing the overall functions and values of wetlands, a watershed boundary is preferred, however, in this case, the watershed would include the entire Lake Champlain Basin and would cover almost half of the state (map 1). In theory, it would be possible to designate the entire state as an Advanced Identification area, but this would serve no useful purpose. Having an area too large runs the risk of lessening the impact of the AIS process.

Proposed study area

For convenience, a political boundary was chosen for the initial study area because most information about threats to the

Map 1. Lake Champlain Drainage Basin and the four counties chosen for the initial study area.

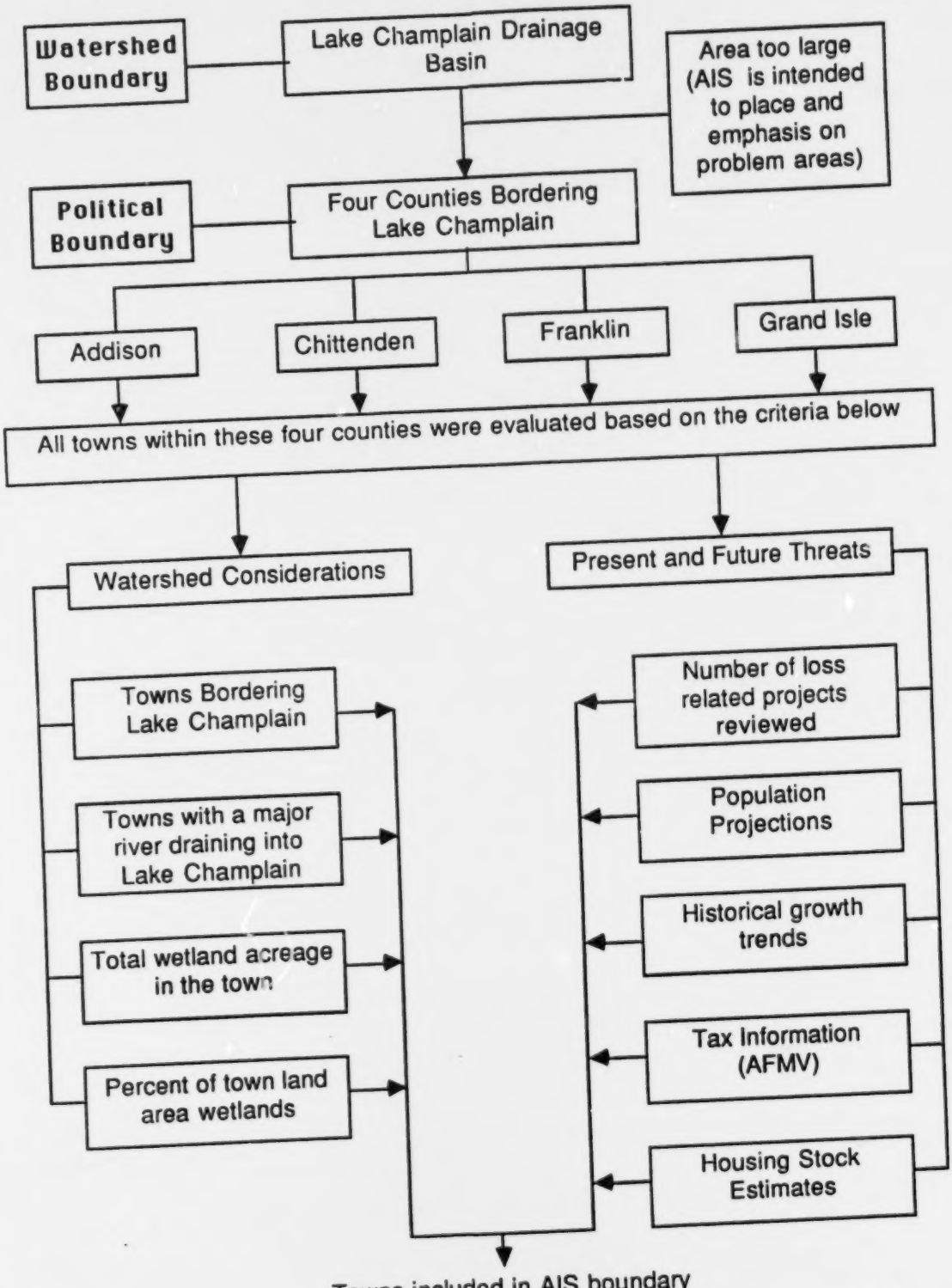


resource is readily available at the town or county level. Although the initial study area does not include the entire watershed, it does include the parts of the watershed that are potentially the most vulnerable to dredge and fill activities. For the initial investigation, information was gathered for four counties bordering Lake Champlain. Every town in Addison, Chittenden, Franklin and Grand Isle County was evaluated based on several criteria that will be discussed in detail later. Although Rutland County is in the Lake Champlain watershed and has two towns bordering Lake Champlain, the decision was made to exclude it in order to focus the effort on Chittenden County and the immediately surrounding areas where growth pressures are greatest.

Evaluation of Criteria

A flow chart of criteria used to determine the boundaries for EPA's proposed Advanced Identification is shown in figure 1. The criteria were used qualitatively as indicators of rapid growth areas that would also be susceptible to loss of valuable wetlands. A quantitative ranking scheme was not used to determine which towns would be included in the AIS boundary. For example, a town bordering Lake Champlain that is already experiencing wetland loss and has a high projected population increase would definitely be considered for inclusion in the AIS boundary. Furthermore, a town does not have to meet all of the criteria in order to be considered for inclusion.

Figure 1. Flow chart of criteria used to determine boundaries for EPA's proposed Advanced Identification (AIS) in the Lake Champlain region of Vermont


Watershed Boundary
Lake Champlain Drainage Basin
Area too large (AIS is intended to place and emphasis on problem areas)
Political Boundary
Four Counties Bordering Lake Champlain
Addison
Chittenden
Franklin
Grand Isle
All towns within these four counties were evaluated based on the criteria below
Watershed Considerations
Present and Future Threats
Towns Bordering Lake Champlain
Towns with a major river draining into Lake Champlain
Total wetland acreage in the town
Percent of town land area wetlands
Number of loss related projects reviewed
Population Projections
Historical growth trends
Tax Information (AFMV)
Housing Stock Estimates
Towns included in AIS boundary

B. Watershed Considerations

Towns within the four county study area were given special consideration depending on their location in the Lake Champlain Drainage Basin and the amount of wetland acres in the town.

Location in the Drainage Basin

The 26 towns bordering Lake Champlain are shown in map 2 and towns with a major river draining into Lake Champlain on or within their boundaries are shown in Map 3. The major rivers in the study area include: the Missisquoi River, the Lamoille River, the Winooski River, and Otter Creek/East Creek.

Wetland Acreage

The National Wetlands Inventory (NWI) reports nearly 220,000 acres of wetlands in Vermont in 1977 (Tiner, 1987). Over half of the wetlands were forested and less than one third were scrub-shrub wetlands. Emergent wetlands represent 11 percent of the state's wetlands. A detailed break-down of wetland acreage by type is provided in Appendix 1 and county wetland acreage totals for Vermont are provided in Appendix 2.

Wetlands account for 3.7 percent of the land area in Vermont (Tiner, 1987). The percentage of county land area covered by wetlands is shown in table 1. Grand Isle had 17.3 percent of its area covered by wetlands, ranking highest in the state. All four of the counties selected for the study area rank in the top 5 wetland acreage for the state.

Map 2. Twenty-six towns and cities bordering Lake Champlain.

Map 3. Towns in the intial study area with major rivers draining into Lake Champlain on or within their boundaries.

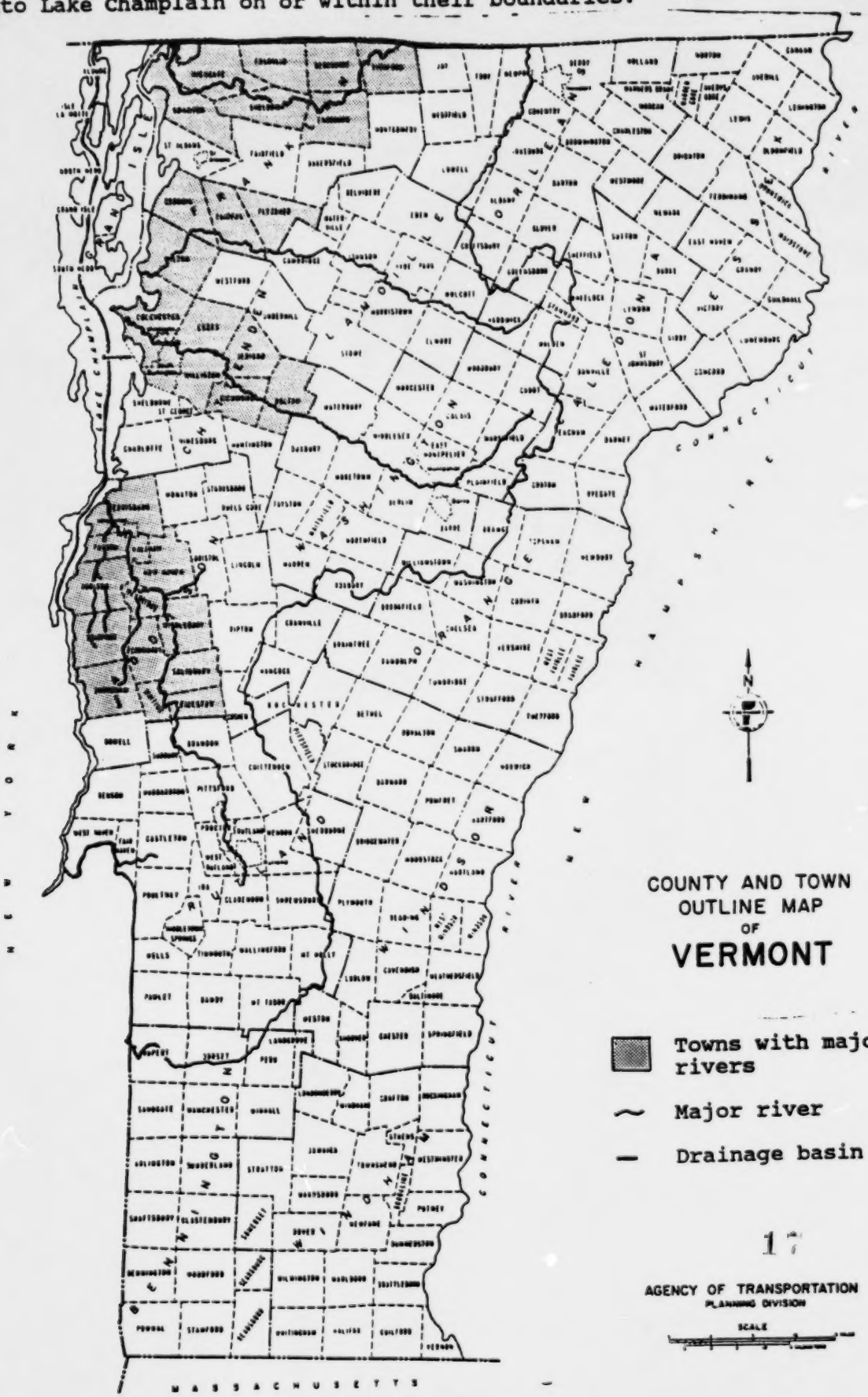


Table 1. Ranking of Vermont Counties based on percent of county land area covered by wetland (from Tiner, 1987).

RANK	COUNTY	% OF COUNTY COVERED BY WETLAND
1	Grand Isle	17.3
2	Essex	7.9
3	Addison	6.3
4	Franklin	6.2
5	Chittenden	4.8
6	Orleans	4.6
7	Rutland	3.9
8	Caledonia	2.8
9	Lamoille	2.6
10	Bennington	2.5
11	Windham	1.9
12	Washington	1.6
13	Orange	1.5
14	Windsor	0.8

For this study, total wetland acreage was calculated from NWI data sheets for all towns in Vermont (see Appendix 3). In addition, wetland acreage was calculated by major wetland types as defined by Cowardin (1979) for the towns in the initial study area (table 2). The percent of land area covered by wetlands for all of these towns was also calculated. Town land area data were obtained from Regional Planning Commissions for the areas in question, and therefore, the figures for the percent of county covered by wetland differ slightly from those calculated by Tiner (1987).

The total wetland acreage for towns and the percent of the town covered by wetlands are shown in map 4 and map 5. The information about the amount of wetlands in a town is intended to give an indication about the potential amount of wetlands under consideration and the distribution of wetlands in the study area.

Table 2. Wetland Acreage for towns in the initial study area based on U.S. Fish and Wildlife National Wetlands Inventory Data Sheets. Wetlands are classified according to Cowardin et al. 1979. Note: totals do not include the littoral zone of Lake Champlain, riverine bars, flats and stream beds.

COUNTY: ADDISON Town	L2	PFO	PSS	PEM	POTH	TOTAL	LAND AREA (ACRES)*	%WETLAND ACRES
ADDISON	0	357	74	565	129	1,124	28,096	4.0
BRIDPORT	0	369	151	1,283	42	1,845	28,736	6.4
BRISTOL	0	380	516	38	45	979	26,368	3.7
CORNWALL	0	2,977	265	213	30	3,484	18,432	18.9
FERRISBERG	0	1,808	732	967	85	3,593	32,320	11.1
GOSHEN	0	189	196	3	7	396	14,192	2.8
GRANVILLE	0	34	124	8	12	178		
HANCOCK	0	13	19	13	12	57		
LEICESTER	0	1,523	561	712	12	2,808	13,696	20.5
LINCOLN	0	246	278	40	42	606	28,096	2.2
MIDDLEBURY	0	1,028	414	377	61	1,880	25,728	7.3
MONKTON	0	1,281	596	262	20	2,158	23,424	9.2
NEW HAVEN	0	939	325	487	42	1,793	27,392	6.5
ORWELL	0	356	308	476	136	1,275	30,464	4.2
PANTON	0	332	13	357	27	728	10,624	6.9
RIPTON	0	217	193	32	61	502	32,576	1.5
SALISBURY	0	1,697	273	919	22	2,911	18,112	16.1
SHOREHAM	32	913	194	458	25	1,622	28,544	5.7
STARKSBORO	0	152	208	54	33	447	28,800	1.6
WERGENNES	0	2	7	27	2	38	1,344	2.8
WALTHAM	0	51	41	69	8	169	5,568	3.0
WEYBRIDGE	0	241	72	284	17	614	11,072	5.5
WHITING	0	1,981	244	199	9	2,433	8,896	27.3
TOTALS	32	17,088	5,801	7,841	877	31,639	442,480	7.2

COUNTY: Chittenden Town	L2	PFO	PSS	PEM	POTH	WETLAND ACRES	LAND AREA (ACRES)	% WETLAND ACRES
BOLTON	0	31	99	14	41	184	26,624	.7
BUEL'S GORE	0	0	3	0	5	8	3,520	.2
BURLINGTON	0	353	2	286	17	658	6,912	9.5
COLCHESTER	0	1,489	646	568	39	2,743	26,240	10.5
CHARLOTTE	0	421	335	428	63	1,247	23,360	5.3
ESSEX	0	692	261	263	70	1,286	24,448	5.3
HINESBURG	0	443	316	139	68	966	25,344	3.8
HUNTINGTON	0	32	102	13	12	159	23,296	.7
JERICHO	0	217	503	102	46	868	22,656	3.8
MILTON	38	2,257	549	824	48	3,716	32,896	11.3
ST. GEORGE	0	29	7	31	3	70	2,304	3.0
RICHMOND	10	194	111	59	30	404	20,288	2.0
SHELBURNE	0	520	339	340	41	1,241	15,552	8.0
S.BURLINGTON	0	193	58	112	25	388	10,432	3.7
UNDERHILL	0	133	336	216	89	773	32,192	2.4
WESTFORD	0	329	314	234	111	987	24,768	4.0
WILLISTON	0	315	168	200	45	728	19,328	3.8
WINOOSKI	0	68	0	0	6	74	832	8.9
TOTALS	48	7,715	4,148	3,828	758	16,497	340,992	4.8

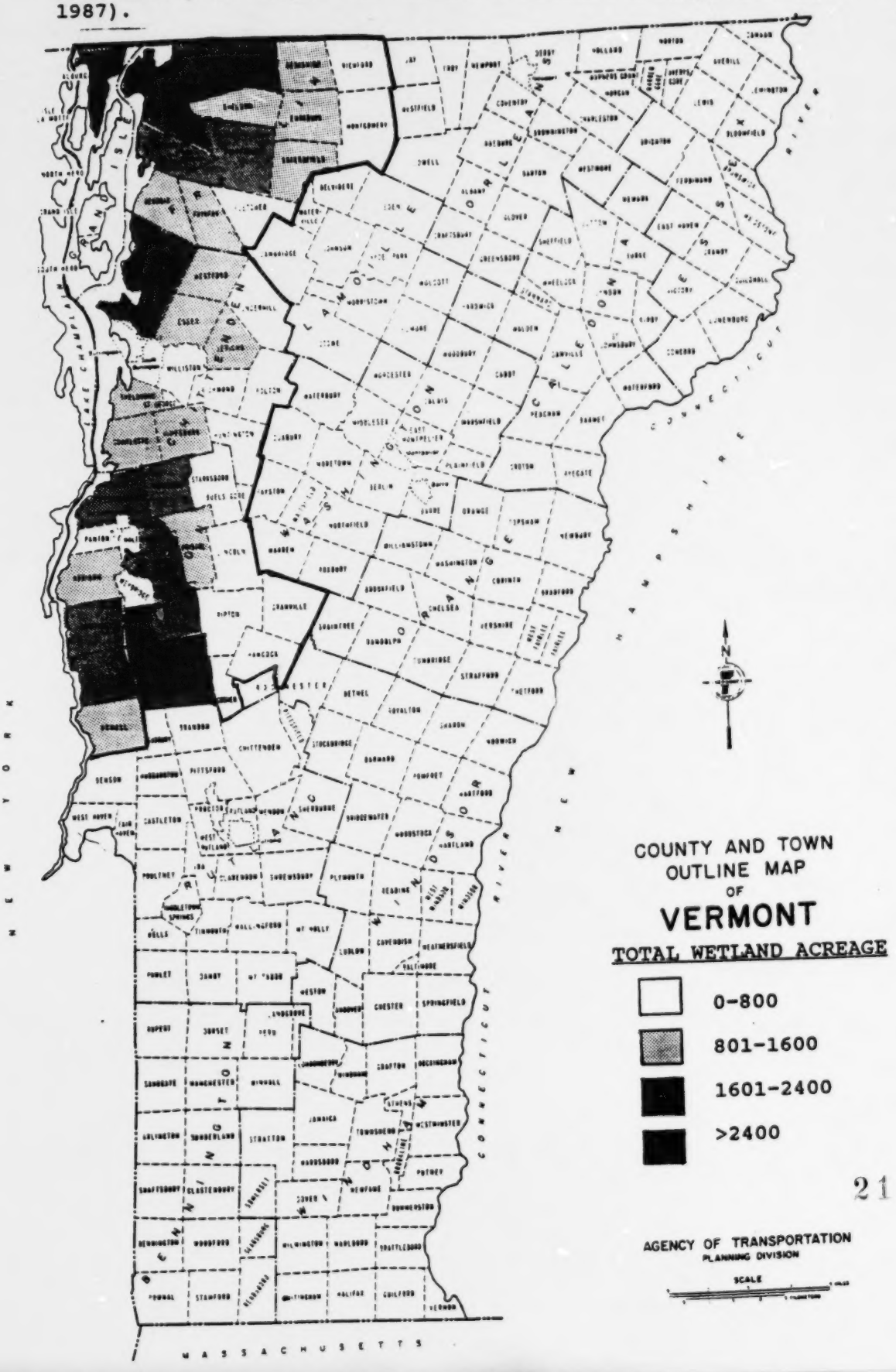
Table 2 (cont'd)

COUNTY: Town	FRANKLIN L2	PFO	PSS	PEM	POTH	TOTAL	LAND AREA (ACRES)*	% WETLAND ACRES
BAKERSFIELD	0	236	571	125	66	998	28,600	3.5
BERKSHIRE	0	442	377	116	34	968	27,904	3.5
ENOSBURG	0	311	320	121	83	835	32,320	2.6
FAIFAX	0	578	443	138	44	1,203	26,688	4.5
FAIRFIELD	0	932	666	246	79	1,923	44,928	4.3
FLETCHER	0	156	399	157	70	782	24,576	3.2
FRANKLIN	0	1,684	579	383	41	2,687	25,536	10.5
GEORGIA	0	486	299	344	50	1,179	25,984	4.5
HIGHGATE	0	3,441	933	895	49	5,317	37,952	14.0
MONTGOMERY	0	203	151	47	18	419	35,904	1.2
RICHFORD	0	224	125	36	41	426	28,352	1.5
SHELDON	0	580	419	122	28	1,148	25,280	4.5
ST.ALBANS	0	1,291	235	157	43	1,726	25,024	6.9
SWANTON	0	4,227	1,751	659	62	6,698	31,744	21.1
TOTALS	0	14,792	7,266	3,544	707	26,309	420,792	6.3

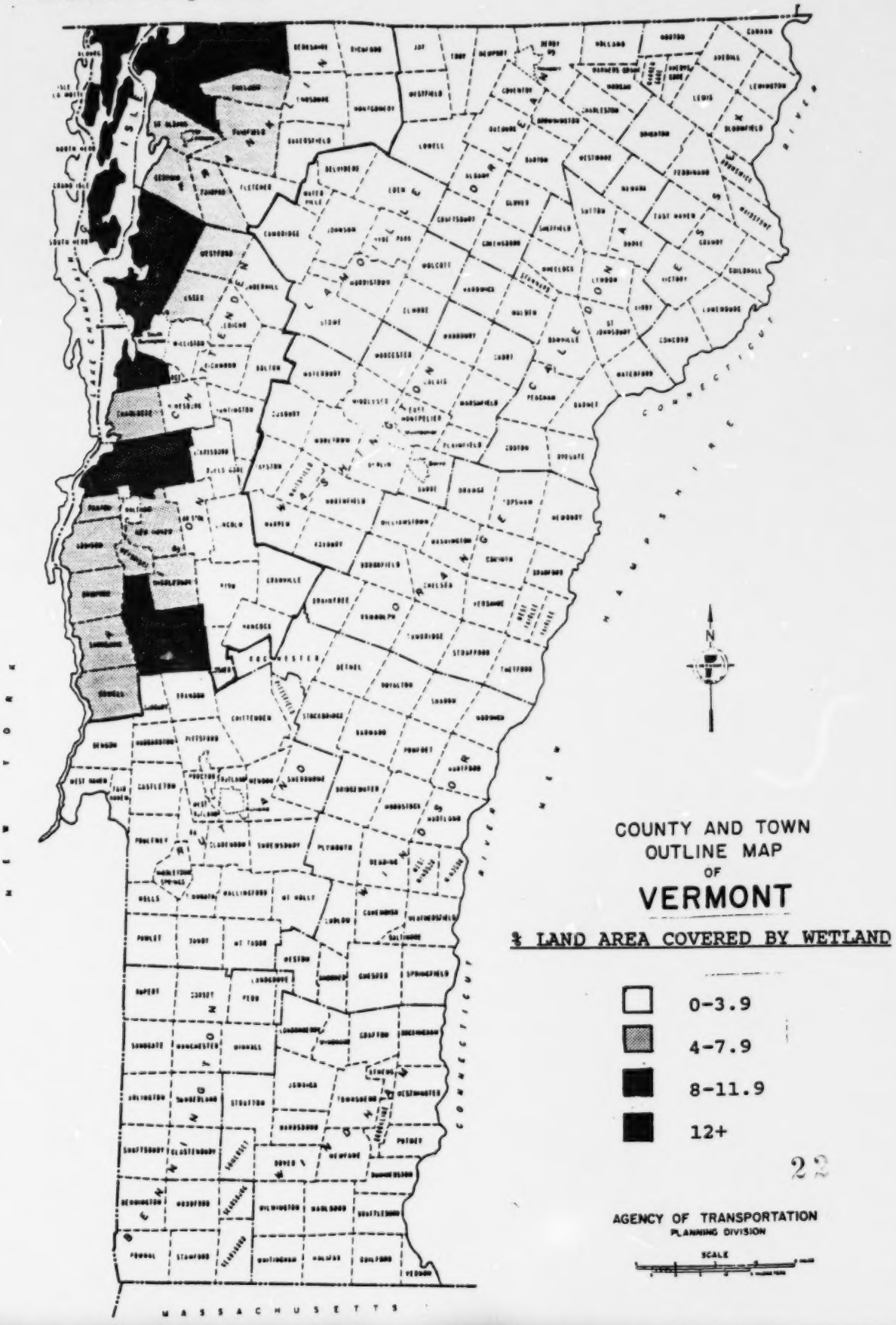
COUNTY: Town	Grand Isle L2	PFO	PSS	PEM	POTH	TOTAL	LAND AREA (ACRES)	% WETLAND ACRES
ALBURG	0	3,987	571	506	45	5,109	18,688	27.3
GRAND ISLE	1	938	61	83	12	1,096	10,624	10.3
ISLE LAMOTTE	5	521	19	45	7	597	4,928	12.1
NORTH HERO	0	1,342	78	101	8	1,529	8,768	17.4
SOUTH HERO	0	557	158	148	14	877	10,880	8.1
TOTALS	7	7,345	887	883	86	9,208	53,888	17.1

*Source: Regional Planning Commission

Map 4. Town wetland acreage based on data sheets used in the Preliminary NWI Report on Vermont's Wetland Acreage (Tiner, 1987).



Map 5. Percent town area covered by wetlands for towns in the initial study area.



Towns experiencing high growth pressures having a large amount of wetlands will be most susceptible to wetland loss.

The town of Alburg, in Grand Isle County, ranked the highest for towns in the study area with 27.3 percent of its land area covered by wetlands. Both the towns of Swanton and Highgate had the highest absolute acreage of wetlands with 6,6[illegible]8 and 5,317 acres respectively. The Missisquoi National Wildl[illegible]fe Refuge contributes to the large number of wetland acres in these two towns. Of the larger towns in the study area, Bolton and Huntington each had less than 1 percent of their land area covered by wetlands.

D. Wetland Loss

Wanner (1979) reported a study that randomly selected one hundred wetlands from the Vermont Fish and Game Inventory and used aerial photograph interpretation to analyze alteration activities in wetlands and a surrounding 1000 ft radius. The study found that as of 1974, 73 percent of the wetlands sampled sustained some modification. The alterations fell under eight categories: 1) roads, 2) bridges, 3) channel dredging and ditching, 4) electric power lines and rights of ways, 5) structures, 6) filling, 7) boat mooring, and 8) logging.

According to records in the Vermont Department of Environmental Conservation (Division of Water Resources), the Wetlands Office has reviewed 652 projects statewide from 1986 through 1988. The Wetlands Office responds to and comments on state Act

250 and federal Section 404 permit applications that involve wetland issues as well as reports of illegal fill. When the wetland resource is being threatened in some way, site visits are conducted.

Loss-related projects reviewed

Since 1986, the number of annual projects reviewed by the Vermont Wetlands Office has been increasing. By mid-August 1988, the number of projects for the year have already equalled the total in 1986 and in late November 1988, the Wetlands Office predicted that they will review a total of 300 projects by the end of the year (table 3).

Table 3. Wetland loss-related projects reviewed by the State Wetlands Office.

1986	1987	1988 (through mid-August)	Total
156	196	300 (156)	652 (508)

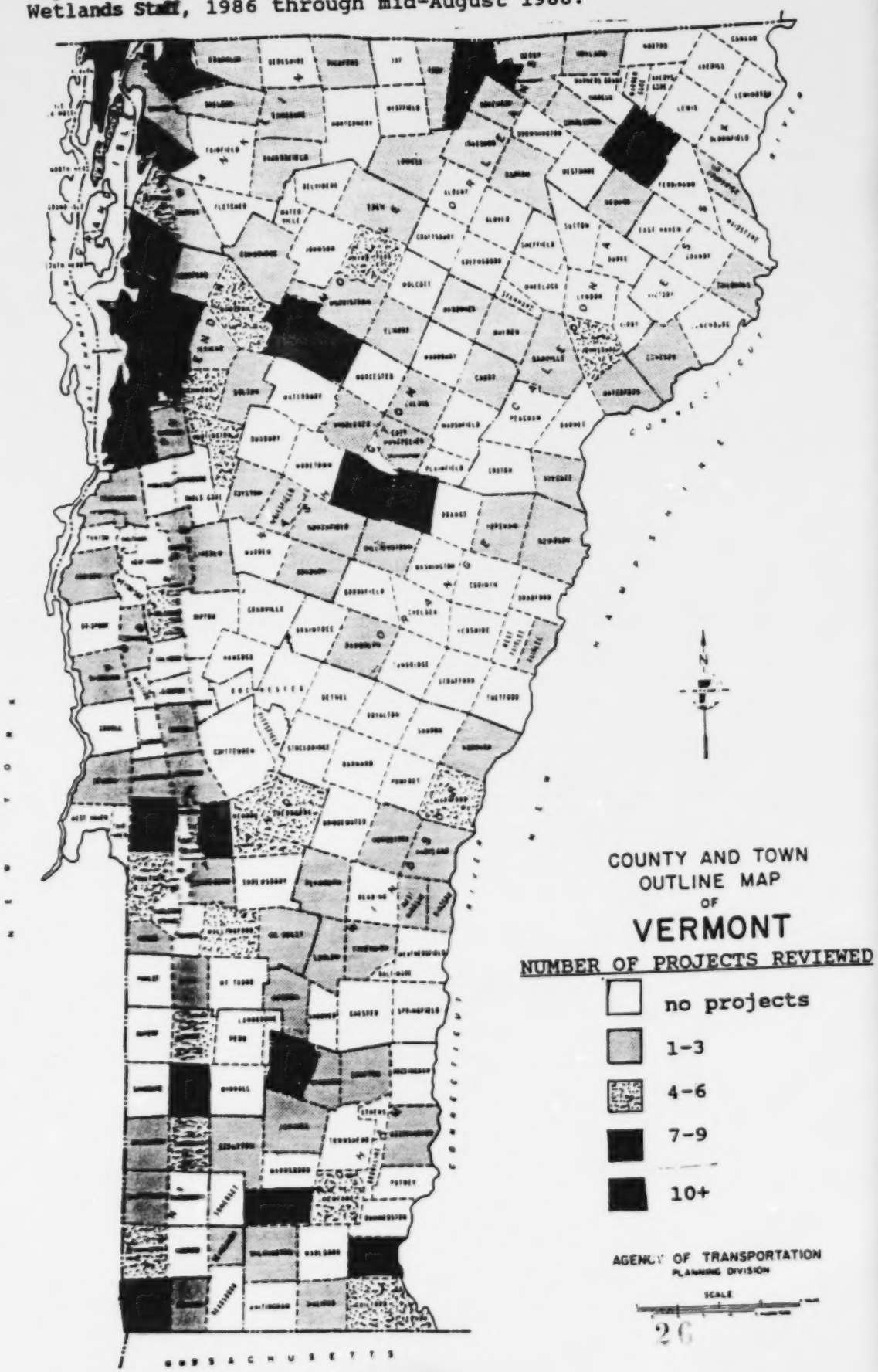
Wetland loss-related projects reviewed by the state from 1986 through mid-August 1988 are summarized for Vermont counties in table 4. Chittenden County accounted for 136, or 27 percent of the total projects reviewed in the state. This is almost twice as much as Rutland County which had the second highest number of projects (74). Both of these counties are also the most heavily populated in the state with high population projections for the year 2000. In total, the four counties within the initial study area accounted for nearly 40 percent of the projects reviewed by the state wetlands staff.

Table 4. Wetland Loss Related Projects Reviewed by the State Wetlands Office (1986 through mid-August 1988)

COUNTY	Projects	% OF TOTAL
Addison	14	2.8
Bennington	46	9.1
Caledonia	11	2.2
Chittenden	136	26.8
Essex	11	2.2
Franklin	32	6.3
Grand Isle	15	3.0
Lamoille	23	4.5
Orange	6	1.2
Orleans	31	6.1
Rutland	74	14.6
Washington	39	7.7
Windham	47	9.3
Windsor	23	4.5
TOTAL	508	

Wetland loss-related projects reviewed by the state wetlands office were also evaluated on a town by town basis from 1986 through mid-August 1988 (see Appendix 4). Loss-related projects reviewed (Map 6) can be used as an indicator of where loss is presently occurring in the state. The town of Williston had more projects involving wetlands (34) than any other town in the state. Williston is located just outside of Burlington and is

Map 6. Wetland Loss-Related Projects Reviewed by the State Wetlands Staff, 1986 through mid-August 1988.



undergoing intense commercial and residential development. Map 6 shows a heavy concentration of loss-related projects occurring in Chittenden County with the towns of Burlington (15 projects), Colchester (17 projects), Essex (15 projects), South Burlington (10 projects) and Williston (34 projects) accounting for 67 percent of the projects in the county. Towns bordering Lake Champlain to the north and south of this area are problem areas as well.

Estimated Wetland Loss

The Wetlands Office files were also analyzed on a project by project basis for 1988 in order to obtain an estimate of wetland loss. A list of projects involving wetland loss for the state through mid-August 1988 is provided in table 5. Wetland loss in Vermont appears to be incremental. Many of the projects involve small amounts of wetlands, but when hundreds of projects are added up over time, the total annual loss becomes significant.

Table 6 summarizes the estimated wetland loss for Vermont in 1988. So far in 1988 (164 projects), 48.7 acres of wetlands have been lost (164 projects) and 15 of those acres have been classified is illegal fill. A number of projects, involving a total of 95.2 acres, are still going through the Act 250 or Section 404 permit review process or are in the negotiation stage. This does not include a recent proposal for a circumferential highway in Chittenden County that involves 27 acres of wetlands. The total loss and potential loss through mid-August 1988 is 170.9 acres.

Table 5. List of projects involving wetland loss obtained from state records for 164 projects in 1988.

WETLAND ACRES LOST IN 1988 (164 projects evaluated)

Ref. #	Town	Acres	Illegal	Comments
1	Williston	0.25		Road Crossing
3	Randolph	1.0		housing development
6	Elmore	2.0	yes	filled by the town
7	Williston	0.7		Road Crossing
12	Danby	2.0		fill
13	Rutland	1.0		fill
16	Highgate	1.0	yes	gravel pit
23	Burlington	0.25		fill
24	Highgate	2.0		truck terminal
26	Brattleboro	1.6		lumber company
29	Manchester	0.5		fill
30	Stowe	0.25		making a pond
31	Manchester	0.37		fill
33	Wallingford	0.5		road
36		1.5	yes	COE involved
37	Coventry	0.7		fill already in, applying for permit
40	Rutland	0.5		proposed pond
46	Middlebury	1.0		residential develop.
48	Burlington	0.25		redidential develop.
49	Poultney	0.25		for septic
58	Shaftsbury	1.0	yes	filling
59	Derby	0.5	yes	fill
60	Alburg	0.5	yes	fill
65	Huntington	2.0		beaver pond
71	Irasburg	1.0	yes	refrigerators, etc..
73	Walden	1.0	yes	filled before permit
74	Middlesex	5.0	yes	1/2 acre illegal
76	Hartford	2.0+	yes	logging roads, etc..
78	Waterbury	0.5	yes	fill
80	Bennington	0.5		filling
81	North Hero	1.0	yes	building a pond
84	Winhall	0.5		filling and ditching
92	Hyde Park	0.5		road crossing
96	Essex	0.25		fill
98	Newfane			dredged
101	Charlotte	2.0		COE may be involved
102	Shelburne	0.7		residential subdiv.
106	Wilmington	0.25		sewer line
107	Enosburg	1.0		
113	Winooski R.	?	yes	fill in cedar swamp
114	Norwich	0.75	yes	fill for gravel pit
125	Newfane	1.0	yes	fill
130	Middlebury	0.25		put in a pond

Table 5. Wetland Acres Lost (cont'd)

Ref. #	Town	Acres	Illegal	Comments
133	Brownington	0.50	yes	potentially more fill
134	Orleans	0.25		drainage ditches
135	Orleans	3.0		road crossing
136	Thetford	0.5		fill
138	Vernon	1.0	yes	fill
141	Weston	0.25	yes	COE asked to restore
142	Lincoln	1.5		fill
143	Colchester	0.25		fill
147	Westford	0.25	yes	road work
152	Sherburne	0.5	yes	already filled
165	Lyndon	0.7	yes	

TOTAL ACRES LOST SO FAR IN 1988 = 48.7
ACRES LOST TO ILLEGAL FILL = 17.5

POTENTIAL LOSS
(projects going through permit process or negotiations)

Ref. #	Town	Acres	Comments
5	Arlington	5-6	waiting on court decision
8	Colchester	2.0	landfill
39		2.0	road project in negot.
41	Manchester	6.0	want to dredge pond
42	Alburg	10.0	housing units
43	Colchester	0.5	logging road
50	Rutland	3.0	state fighting them on it
54	Newbury	5.0	logging
56	Dover	1.0	public building
72	Newport	0.95	fill for medical bldg.
100	Newport	0.25	fill
102	Shelburne	0.20	residential subdiv.
116	Colchester	2.0	not resolved
126	Colchester	<1	mitigation proposed
128	Hyde Park	50.0	draining every year
155	Hubbardton	1.0	dredging and clearing
157	Hubbardton	1.0	proposed dredge
158	Hartland	<1	shopping center
162	Stowe	0.25	creation of ponds
163	Proctorsville	2.0	
164	Barten	2.0	fill for gravel oper.

POTENTIAL ACRES LOST IN 1988 (THROUGH AUG. 15) = 95.2

PROPOSED CIRCUMFERENTIAL HIGHWAY = 27 ACRES OF WETLAND

STATE WETLANDS STAFF TALKED PEOPLE OUT OF 249.3 ACRES

TOTAL ACRES LOST OR POTENTIALLY LOST = 170.9

Table 6. Estimated wetland loss for Vermont in 1988.

	recorded through mid-August	estimated actual loss	Annual loss
Wetland loss (acres)	48.7	97.4	177.1
Additional potential loss	95.2	--	173.3
Proposed Highway	27.0	--	27.0
WETLAND LOSS	170.9	219.6	377.4

A previous study by Parsons (1988) estimated that the wetland loss recorded by the state is approximately 50 percent of what is actually taking place. This means that the actual wetland loss for the 164 projects in 1988 is potentially as high as 97.4 acres. The annual wetland loss was calculated using the assumption that wetland loss per project would occur at the same rate for the rest of the year. Assuming that 164 projects represents 55 percent of the total projects for the year (300), then 97.4 acres represents 55 percent of the annual wetland loss. Using this calculation, the estimated annual loss totals 177.1 acres. Using the same assumption, potential loss was also calculated for the year and totals 173.3 acres. The estimated annual loss using these figures plus the 27 acres for a proposed circumferential highway is 377.4 acres. For the recorded acres lost through mid-August 1988 (48.7), the state wetlands staff talked people out of filling 249.3 acres during the same time period. Assuming the state has the same success rate (84 %) for the second half of the year, only 27.7 of the potential 173.3 acres will be lost. The estimated annual loss, corrected for

this success rate, totals 238.8 acres.

E. Population Projections

The Vermont State Health Department (1983) has published population projection data from 1980 to the year 2000. Vermont's total population is projected to increase 20 (low series) and 28 (high series) percent from 1980 to 2000. Low and High series population projections for counties in Vermont are listed in table 7. The high series projection assumes that migration rates through the year 2000 will continue at the rate observed during 1970 - 1980. The low series projection reduced migration rates in order to obtain a labor force population approximating the economic projections developed by the U.S. Department of Commerce. The low series projection is nearly identical to that observed during 1975-1980.

Table 7. (Vermont Dept. of Health, 1983)

PROJECTIONS OF THE POPULATION OF VERMONT TO 2000 BY COUNTY

	1980 CENSUS	PROJECTION TO 2000 LOW SERIES		PROJECTION TO 2000 HIGH SERIES	
		PROJECTED POPULATION	% CHANGE 1980-2000	PROJECTED POPULATION	% CHANGE 1980-2000
STATE	511,456	611,806	19.6	652,552	27.6
Addison	29,406	36,793	25.1	39,709	35.0
Bennington	33,345	39,503	18.5	42,479	27.4
Caledonia	25,808	31,456	21.9	34,380	33.2
Chittenden	115,534	136,315	18.0	141,768	22.7
Essex	6,313	7,720	22.3	8,445	33.8
Franklin	34,788	41,567	19.5	43,135	24.0
Grand Isle	4,613	6,453	39.9	7,500	62.6
Lamoille	16,767	22,085	31.7	24,798	47.9
Orange	22,739	31,676	39.3	36,794	61.8
Orleans	23,440	29,005	23.7	31,726	35.3
Rutland	58,347	66,507	14.0	70,603	21.0
Washington	52,393	60,598	15.7	63,567	21.3
Windham	36,933	44,033	19.2	46,476	25.8
Windsor	51,030	58,095	13.8	61,172	19.9

The population in Addison, Chittenden, Franklin and Grand Isle Counties, four of the five counties that border Lake Champlain, will account for 45 percent of the state's population by the year 2000. Chittenden County, the most populous region in the state, is expected to have the greatest numerical change in population (26,234). Grand Isle County shows the greatest percent change with a high series projection of 63 percent and a low series projection of 39 percent growth.

Table 8 summarizes the State Health Department Population Projections (1983) for the year 2000 for all the towns in Addison, Chittenden, Franklin and Grand Isle Counties. The percent growth and numerical change in population for the year 2000 are displayed in map 7 and map 8 respectively.

Both percent growth and numerical change were considered to provide a more complete picture of population pressures in the study area. Towns such as Bolton, with a small population and high expected growth rates may result in low numerical increases in population. On the other hand, a large city such as Burlington, expecting a growth of 7.8 percent by the year 2000 will result in a significant numerical increase in population in the region. For this study, numerical increases in population provide a better indication of the type of population pressure that would pose a threat to wetlands. Numerical increases in population for the initial study area are concentrated around Burlington in Chittenden County and in the lake shore communities to the north.

Table 8. State Health Department Population Projections for the year 2000. Percent change was calculated from 1980 to 2000. Low series population projections were used for all towns except those in Chittenden County and "bedroom communities" of Chittenden County. According to the Vermont Office of Policy and Research, that has been the trend experienced in the past.

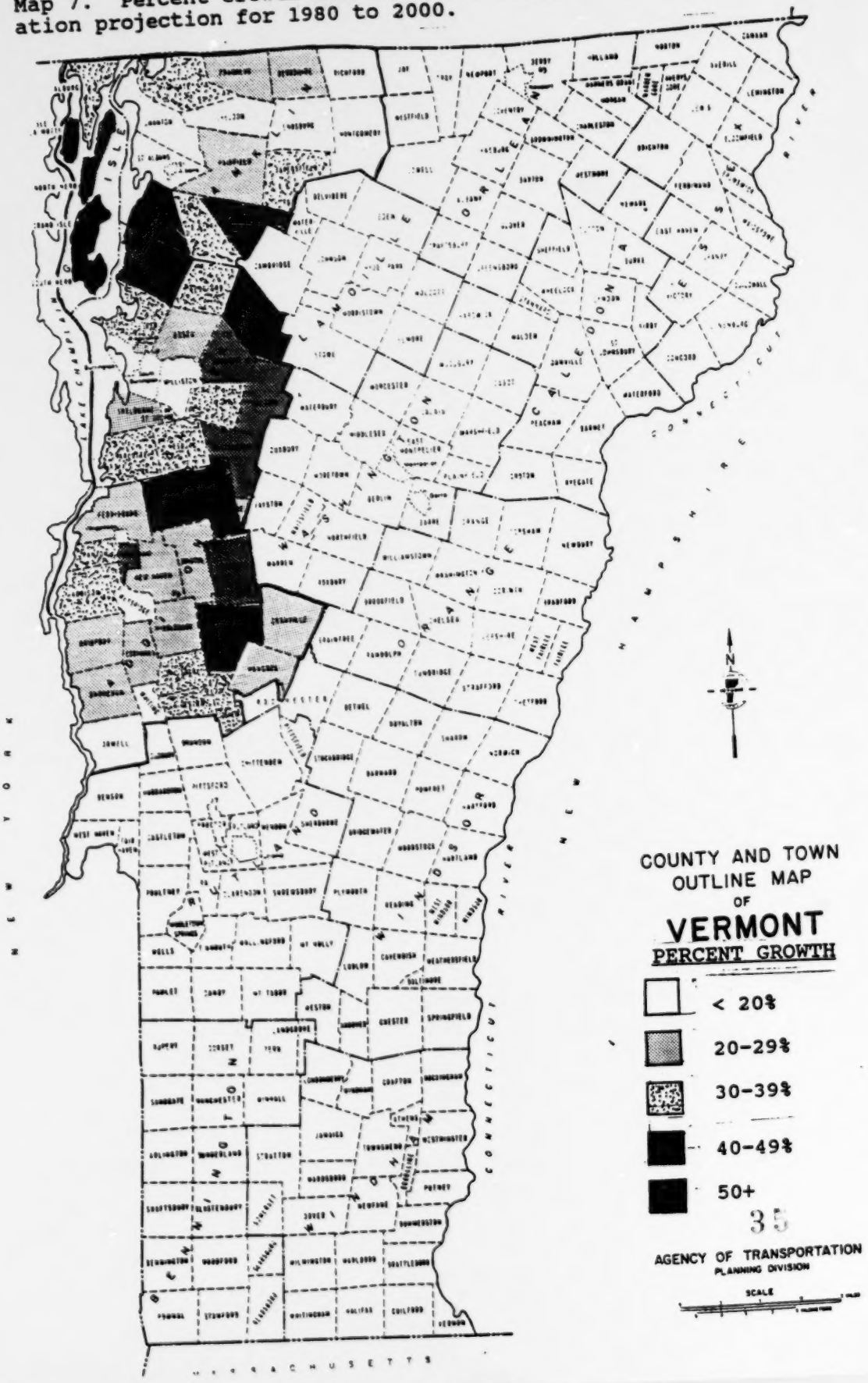
Town	1980 Census	# change*	% growth
ADDISON COUNTY			
Addison	889	220	24.7
Bridport	997	241	24.2
Bristol	3,293	733	22.3
Cornwall	993	163	16.4
Ferrisburg	2,117	579(H)	27.4
Goshen	163	52	31.9
Granville	288	51	17.7
Hancock	334	70	21.0
Leicester	803	270	33.6
Lincoln	870	336	38.6
Middlebury	7,574	1,493	19.7
Monkton	1,201	697(H)	58.0
New Haven	1,217	249	20.5
Orwell	901	125	13.9
Panton	537	149	27.7
Ripton	327	149	58.7
Salisbury	881	285	32.3
Shoreham	972	235	24.2
Starksboro	1,336	1,215(H)	90.9
Vergennes	2,273	246	10.8
Waltham	394	160	40.6
Weybridge	667	99	14.8
Whiting	379	51	13.5
CHITTENDEN COUNTY			
Bolton	715	357	49.9
Buel's Gore	9	2	22.2
Burlington	37,712	2,960	7.8
Charlotte	2,561	834	32.6
Colchester	12,629	4,401	34.8
Essex	14,392	3,935	27.3
Hinesburg	2,690	1,060	39.4
Huntington	1,161	485	41.8
Jericho	3,575	1,435	40.1
Milton	6,829	2,720	39.8
Richmond	3,159	1,034	32.7
Shelburne	5,000	1,449	29.0
S. Burlington	10,679	1,365	12.8
St. George	677	228	33.7
Underhill	2,172	1,271	58.5
Westford	1,413	479	33.9
Williston	3,843	803	20.9
Winooski	6,318	1,416	22.4

Table 8. Population Projections (cont'd)

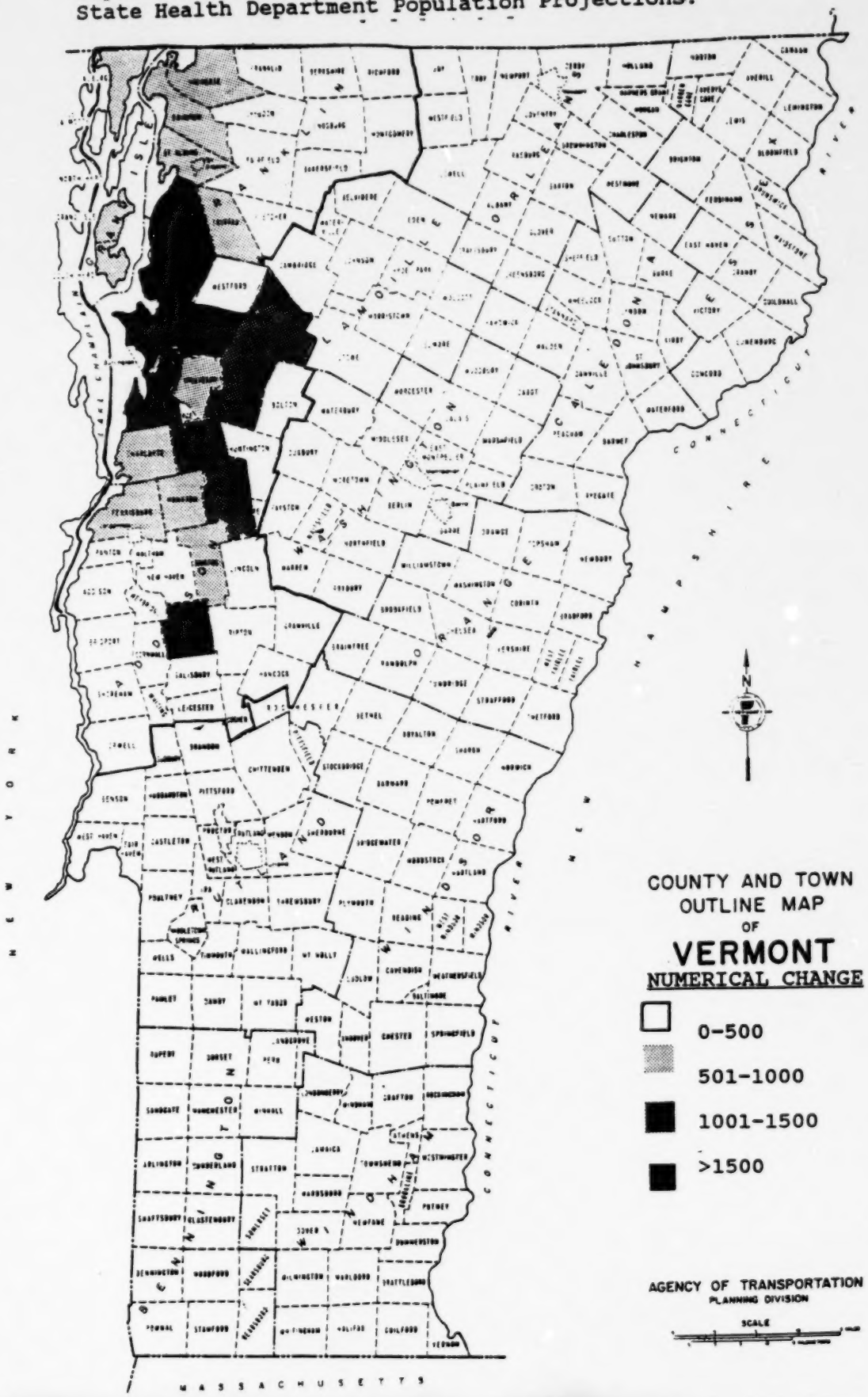
Franklin County	1980 Census	# change	% growth
Bakersfield	852	307	36.0
Berkshire	1,116	263	23.7
Enosburg	2,070	285	13.8
Fairfax	1,805	712(H)	39.4
Fairfield	1,493	308	20.6
Fletcher	626	244	39.0
Franklin	1,006	261	25.9
Georgia	2,818	1982(H)	70.3
Highgate	2,493	780	31.3
Montgomery	681	76	11.2
Richford	2,206	238	10.8
Sheldon	1,618	240	14.8
St. Albans Tn.	3,555	513	14.4
St. Albans Cty.	7,308	-12	-0.2
Swanton	5,141	847	16.5
Grand Isle County			
Alburg	1,352	300	22.2
Grand Isle	1,238	989(H)	67.4
Isle La Motte	393	205	52.2
North Hero	442	239(H)	54.1
South Hero	1,188	789(H)	66.4

*Numbers with (H) are towns or "bedroom communities" outside of Chittenden County where the high series population projection is the better estimate.

Map 7. Percent Growth based on State Health Department Population projection for 1980 to 2000.



Map 8. Numerical Change in population from 1980 to 2000 based on State Health Department Population Projections.



F. Historical Growth Trends

The 1980's mark Vermont's third consecutive decade of sustained, rapid development. According to Cowart (1985), the development crisis facing Vermont in the 1980's is quite different than the one experienced in the 1960's. When referring to this new quiet development crisis Cowart states:

> [In the late 1960's] we were concerned about the massive effects of large-scale development projects. Today, we realize the same effects, and sometimes worse, can result from the relentless accumulation of development projects, whether large or small, in a town or region. (p.1)

The report of the Governor's Commission on Vermont's Future (Costle, 1988) states that Vermont's rate of economic growth has ranked among the highest in the nation during the last five years. Of the major industries, construction showed the strongest rate of growth with a 50 percent increase in employment.

In the Growth Areas Research Project Report, Cowart (1985) summarized the three main aspects of the major development transformation occurring in Vermont:

> 1. The magnitude of development is unprecedented in Vermont History, and appears to be continuing at an impressive rate.
>
> 2. The dominant growth patterns are suburbanization surrounding major employment centers and destination resort development in and around mountain ski towns.
>
> 3. To a significant degree, rapid and sustained growth is concentrated in a few high growth towns, most of them located in six multi-town rapid growth areas.

The greater Burlington area is identified in the report as one of the six multi-town rapid growth areas. Growth patterns in the Burlington area are more related to suburbanization than resort

development. As a result, development pressures in this area probably result more from the "relentless accumulation of projects" mentioned above. This, combined with indications from wetland loss data in Vermont, points to the problem of cumulative impacts of development.

The Growth Areas Research Project (Cowart, 1985) ranked every town in the state according to four selected growth measurements. The results from their study, which included the top 25 towns for each growth measurement, were used in this study as an indication of historical growth trends. Table 9 lists the towns in the AIS boundary that rank in the top 10 percent for the state. The towns that appear on the growth indicator lists are displayed in Map 9. Because many of the same criteria were used, historical trends are similar to projected population pressures in the study area. Towns that appear on the growth indicators list cluster around Burlington and north into the lakeshore communities. Middlebury, the most populous town in Addison County, also showed up on several of the growth indicator lists.

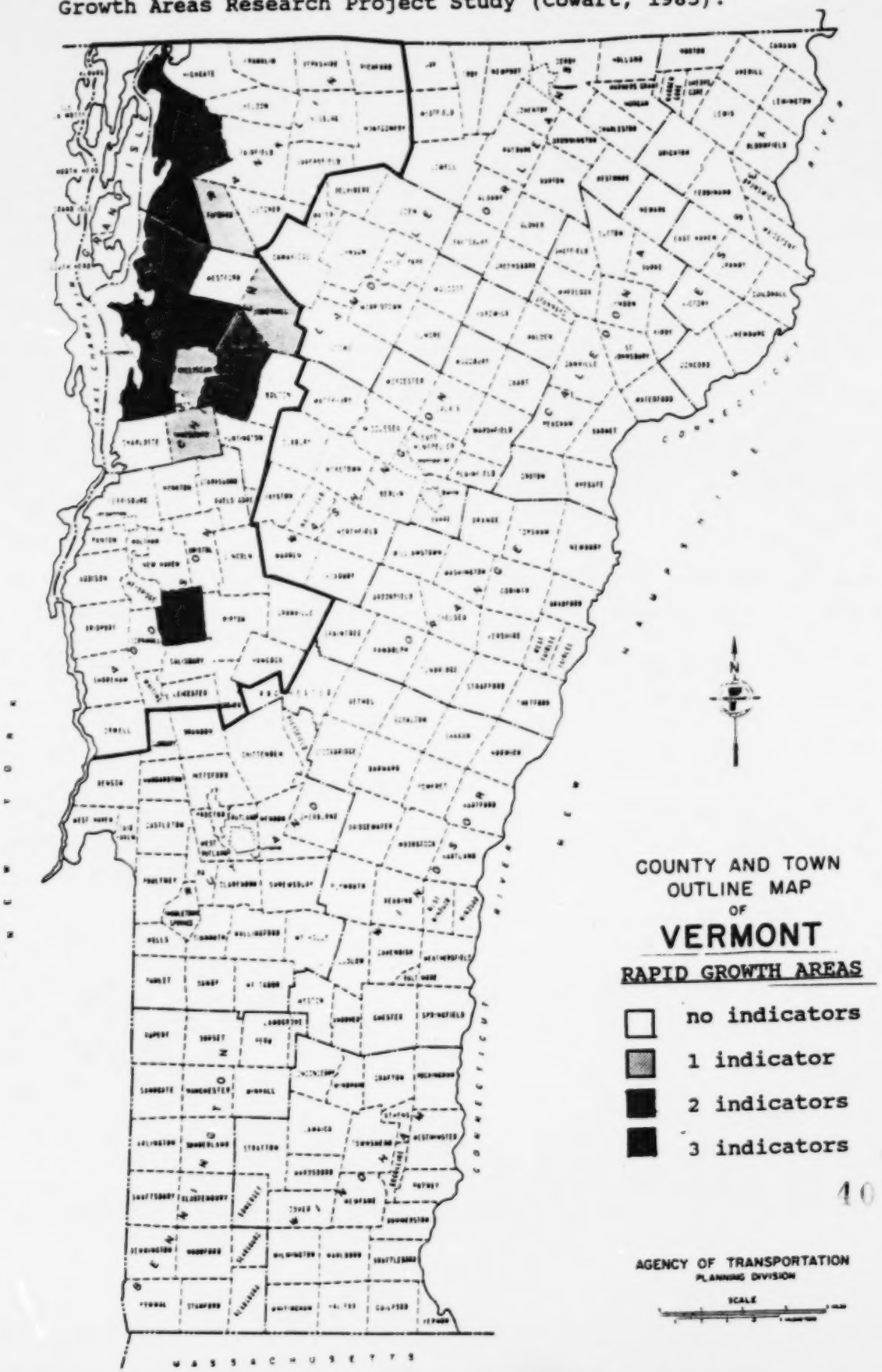
G. Tax Information

Tax information was used in this study as a measure of land values in towns and indirectly as another indicator of development pressures. During a two-year period from 1985 to 1987, the value of real property available for taxation by local governments and school districts in Vermont increased 22 percent (Vermont Department of Taxes, 1988). This increase parallels the

Table 9. Towns in the AIS boundary that rank in the top 10 percent for the state based on four growth measurements in the Growth Areas Research Project (Cowart, 1985).

Town	Absolute Growth Index	Rate of Growth Index	Employment Growth (rate)	Employment Growth (Absolute)	Construction Costs (1980)	Construction Costs (1984)	Rapid Growth Area
Alburg							
Burlington				1	4	1	√
Charlotte							
Colchester	2		4	4	14	23	√
Essex	1			3	1	8	√
Fairfax			14				√
Ferrisburg							
Georgia	15	19	1	22	2		√
Grand Isle							
Highgate							
Hinesburg	17						√
Isle la Motte							
Jericho	11	23					√
Milton	4		20				√
North Hero							
Richmond	20		24				√
St. Albans				25		16	√
St. George							
Shelburne	6			19	12		√
S. Burlington	10		23	2	7	3	√
South Hero							
Swanton	24				16		√
Underhill		8					√
Westford							
Williston						18	√
Winooski					18	21	√

Map 9. Map of towns appearing on growth indicator lists in the Growth Areas Research Project Study (Cowart, 1985).



growth in fair market values of taxable property which was the most dramatic ever recorded during a two year period.

Aggregate fair market value (AFMV) and effective tax rates for towns in the initial study area are listed in table 10. Effective tax, or equalized tax, is the percentage that property tax liability represents of the fair market value. AFMV's for towns in the study area are shown in Map 10. As expected, the largest AFMV's centered around the greater Burlington area and lakeshore communities to the north and south of Burlington.

H. Housing Stock Estimates

Historically, the state's housing stock grew 64 percent from 1960 to 1980 (Cowart, 1985). This increase was more than double the population increase for the same period. Cowart (1985) claims that the increase is due to two main factors. The first is a significant decrease in average household size, and the second factor is a significant increase in the number of second homes.

Vermont Housing unit growth from 1980 to 1986 is displayed in Map 11. All of the towns in Chittenden County had high or moderate housing unit growth during 1980 - 1986. In contrast, most of the towns in Addison County had moderate to low housing unit growth. Healy (1987) ranked towns in Vermont based on total housing unit growth from 1980 - 1986. The twenty-five largest growth communities are listed in table 11. Eleven of the top twenty-five growth communities occur within the initial study area.

Table 10. Tax rate and Aggregrate Fair Market Value information for towns in four counties bordering Lake Champlain from the Vermont Department of Taxes Annual Report, 1987.

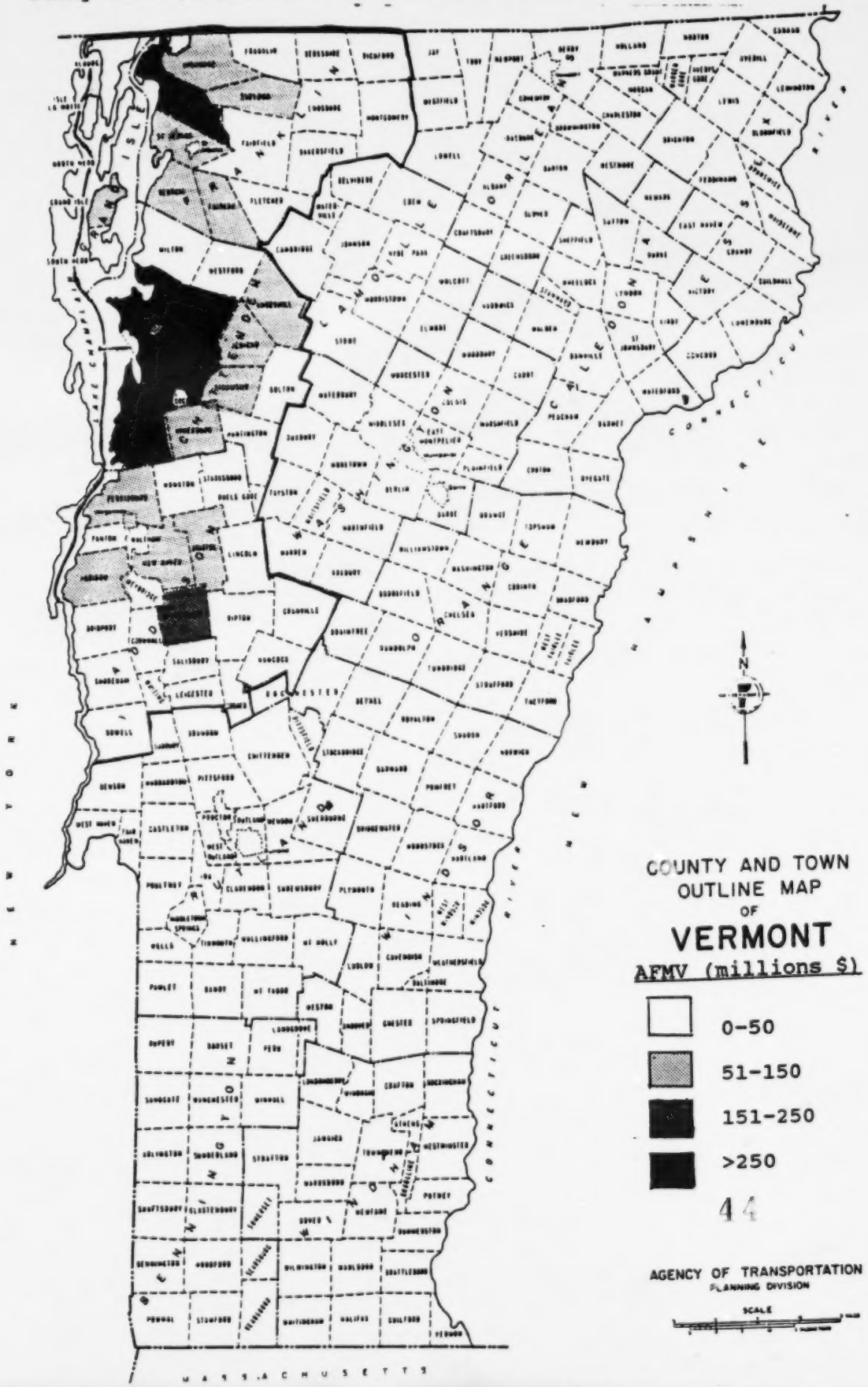
	AFMV* (millions $)	Effective Tax Rate
Addison County		
Addison	51.2	1.6
Bridport	41.1	1.8
Bristol	73.4	1.8
Cornwall	43.1	2.0
Ferrisburg	93.3	1.7
Goshen	8.8	1.7
Granville	14.9	1.2
Hancock	15.4	1.2
Leicester	36.0	1.0
Lincoln	35.9	1.6
Middlebury	230.3	2.3
Monkton	42.7	1.8
New Haven	56.9	1.7
Orwell	35.5	1.9
Panton	22.9	1.8
Ripton	18.2	1.6
Salisbury	45.5	1.6
Shoreham	43.8	2.1
Starksboro	40.2	1.9
Vergennes	83.0	1.8
Waltham	12.4	1.8
Weybridge	35.2	2.1
Whiting	12.8	1.4
Chittenden County		
Bolton	44.8	1.1
Buel's Gore	1.3	0.5
Burlington	1,476.4	1.8
Charlotte	167.9	1.7
Colchester	460.7	1.9
Essex	425.1	2.0
Essex Jct.	765.3	1.6
Hinesburg	112.4	2.3
Huntington	38.4	2.4
Jericho	97.1	2.0
Milton	209.5	1.9
Richmond	95.0	2.0
Shelburne	307.7	2.0
S. Burlington	665.8	2.1
St. George	17.1	1.9
Underhill	73.1	1.9
Westford	49.8	2.0
Williston	274.8	1.6
Winooski	170.3	2.3

Table 10 (cont'd)

Franklin County	AFMV (millions $)	Effective Tax Rate
Bakersfield	23.0	2.4
Berkshire	22.6	2.2
Enosburg	45.1	2.4
Fairfax	68.9	1.8
Fairfield	38.6	2.0
Fletcher	23.5	1.9
Franklin	24.5	1.5
Georgia	143.5	1.4
Highgate	82.8	1.4
Montgomery	32.9	1.7
Richford	41.5	1.9
Sheldon	58.9	1.5
St. Albans Tn.	145.4	1.8
St. Albans Cty.	160.2	2.3
Swanton	158.4	1.3
Grand Isle County		
Alburg	43.3	1.7
Grand Isle	74.0	1.6
Isle La Motte	17.6	1.6
North Hero	20.5	0.9
South Hero	19.3	1.5

*AFMV is the Aggregrate Fair Market Value of the property in the town.

Map 10. Aggregrate fair market value of towns in the initial study area (data from Vermont Department of Taxes, 1988).



Map 11. Vermont Housing Unit Growth 1980-1986 (from Healy, 1987).

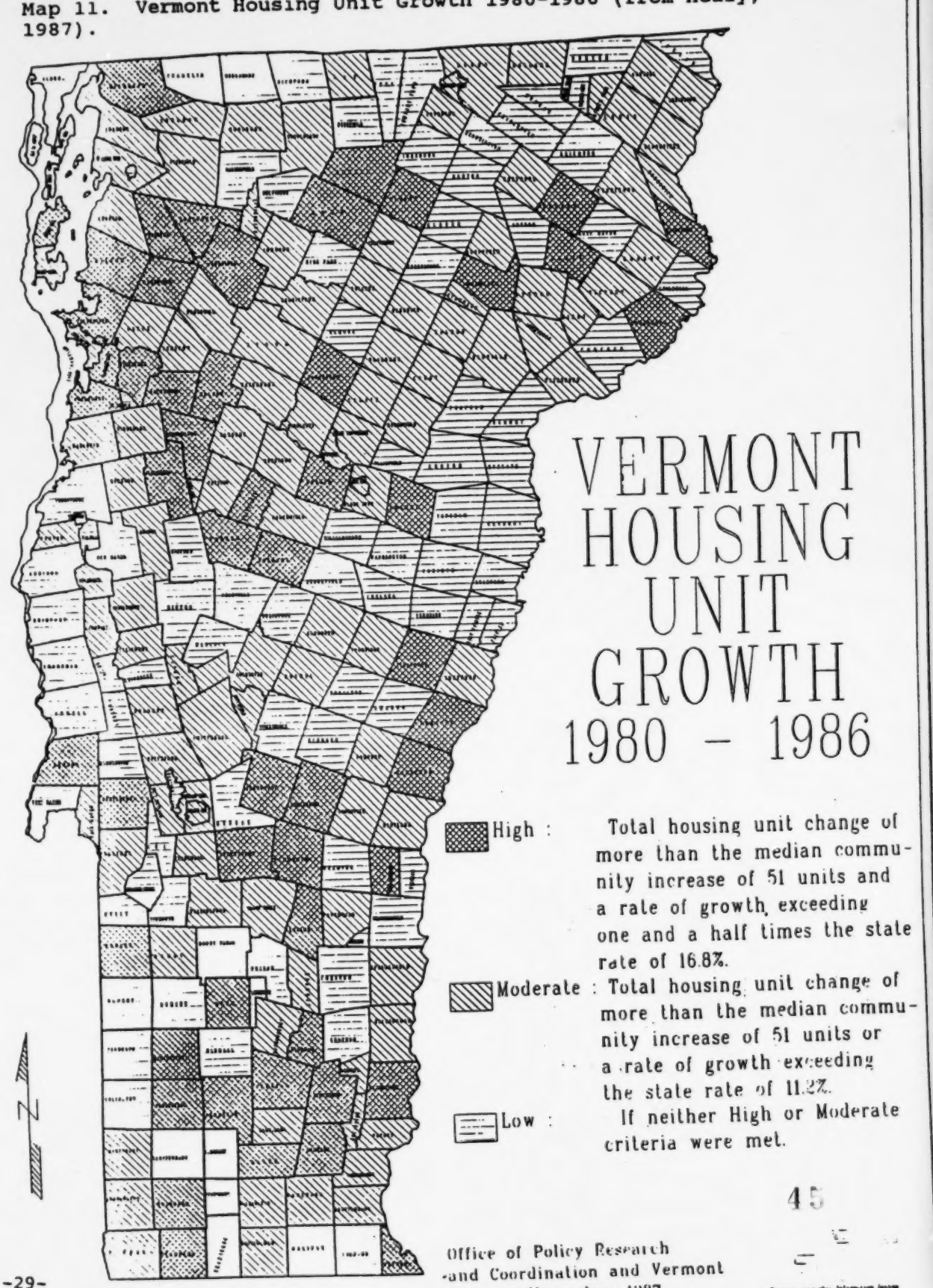

VERMONT
HOUSING
UNIT
GROWTH
1980 - 1986
High : Total housing unit change of more than the median community increase of 51 units and a rate of growth exceeding one and a half times the state rate of 16.8%.
Moderate : Total housing unit change of more than the median community increase of 51 units or a rate of growth exceeding the state rate of 11.2%.
Low : If neither High or Moderate criteria were met.
N
Office of Policy Research and Coordination and Vermont G.I.S. November 1987

Table 11. TOTAL HOUSING UNIT GROWTH
1980-1986
Twenty Five Largest Growth Communities

Absolute Growth Rank	Community	1980	1986	Absolute Change	Percent Change	Housing Growth Rating
	VERMONT	223,199	248,301	25,102	11.2%	
1	Sherburne	1,111	2,159	1,048	94.3%	High
2	So. Burlington	3,972	4,917	945	23.8%	High
3	Hartford	3,483	4,398	915	26.3%	High
4	Dover	831	1,656	825	99.3%	High
5	Burlington City	13,763	14,576	813	5.9%	Moderate
6	Colchester	4,566	5,331	765	16.8%	Moderate
7	Essex	4,826	5,489	663	13.7%	Moderate
8	Manchester	1,634	2,270	636	38.9%	High
9	Milton	2,321	2,932	611	26.3%	High
10	Warren	1,337	1,861	524	39.2%	High
11	Ludlow	1,726	2,219	493	28.6%	High
12	Brattleboro	4,866	5,326	460	9.5%	Moderate
13	Castleton	1,706	2,160	454	26.6%	High
14	Stratton	351	765	414	117.9%	High
15	Bennington	5,815	6,214	399	6.9%	Moderate
16	Cambridge	845	1,225	380	45.0%	High
17	Winooski City	2,403	2,775	372	15.5%	Moderate
18	Rutland City	7,341	7,709	368	5.0%	Moderate
19	Shelburne	1,719	2,052	333	19.4%	High
20	Williston	1,284	1,538	254	19.8%	High
21	Middlebury	2,234	2,473	239	10.7%	Moderate
22	Lyndon	1,753	1,985	232	13.2%	Moderate
23	Grand Isle	723	933	210	29.0%	High
24	Highgate	926	1,135	209	22.6%	High
25	Wilmington	1,645	1,854	209	12.7%	Moderate

Source: Vermont Department of Health, Statistics Division, 1986 Estima
Table Prepared by OPRC 12/87

IV. PROPOSED ADVANCED IDENTIFICATION BOUNDARY

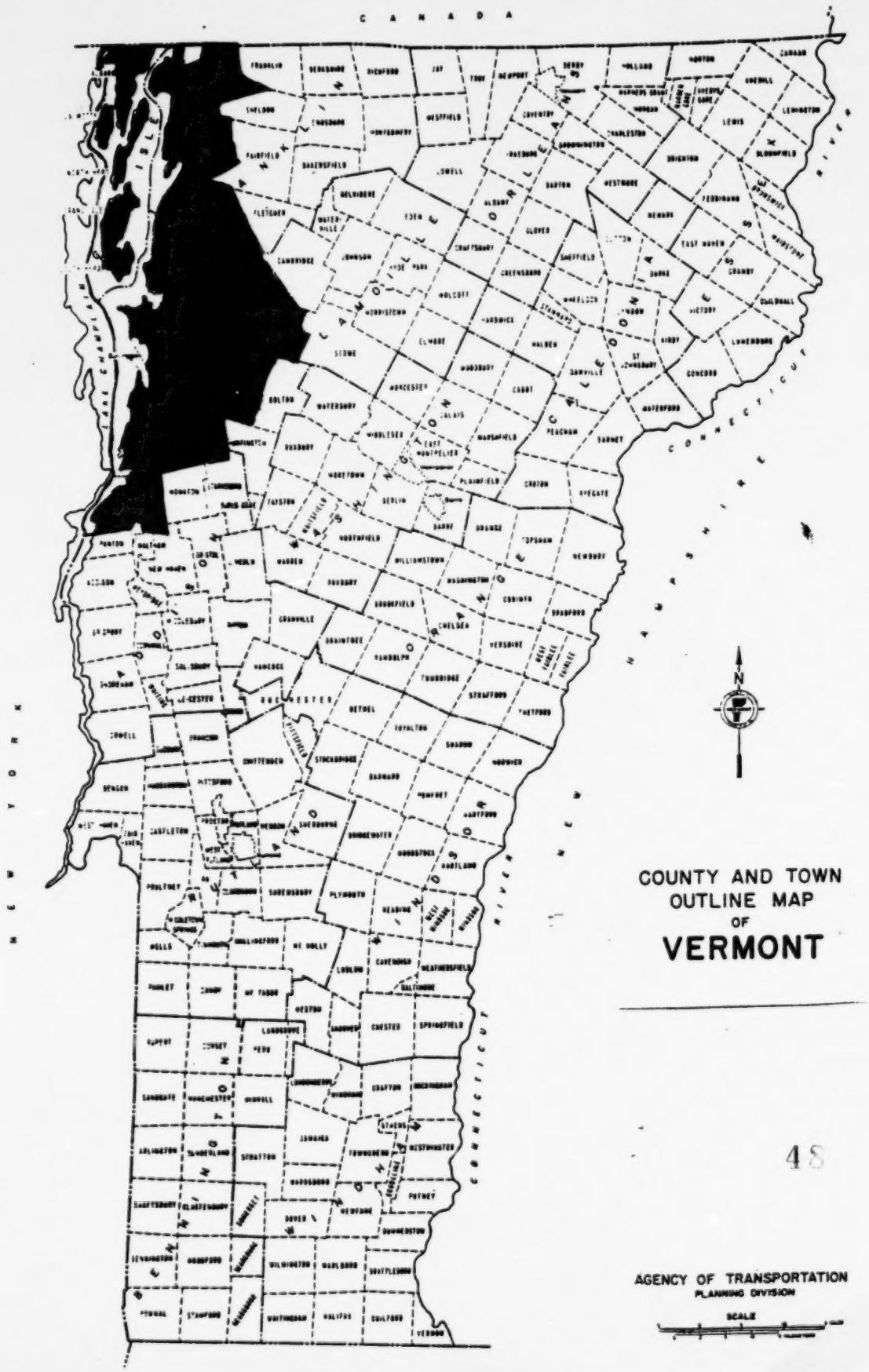
The twenty-six towns proposed for inclusion in the Advanced Identification boundary are shown in Map 12 and are listed below.

Addison County:	Ferrisburg
Chittenden County:	Burlington Charlotte Colchester Essex Hinesburg Jericho Milton Richmond St George Shelburne South Burlington Underhill Westford Williston Winooski
Franklin County:	Fairfax Georgia Highgate St. Albans (Town and City) Swanton
Grand Isle County:	Alburg Grand Isle Isle La Motte North Hero South Hero

Addison County (1 town)

Although many towns in Addison County satisfied the watershed considerations, only the town of Ferrisburg is being considered for inclusion for two main reasons. First, in addition to satisfying all of the watershed considerations, Ferrisburg showed up as a town with high projected numerical

Map 12. Proposed Advanced Identification Boundary.



increases in population (map 8), as a town where wetland loss is presently occurring (map 6), and as a town with high AFMV (map 10). Ferrisburg was also included because it is continuous with the AIS boundary and keeps the focus on Chittenden County and the immediately surrounding areas.

Chittenden County (15 towns)

All but three towns in Chittenden County were included in the AIS boundary. The towns that were included displayed a wide range of both values and threats. Many towns either border Lake Champlain or are located in the Winooski River drainage. On the whole, Chittenden County is well above the state average for the percent of land area covered by wetlands. Chittenden County also accounted for nearly 30 percent of the wetland loss-related projects by state wetlands staff and almost twice as much as any other county (table 4 and map 6). To add to the threat side of the equation, the projected numerical increase in population for Chittenden County is the highest in the state (table 7 and map 8). Twelve towns in Chittenden County were identified by Cowart (1985) as rapid growth areas (table 9 and map 9). All towns in the county had moderate to high housing unit growth from 1980 to 1986 (map 11). As expected, the greater Burlington area had the highest AFMV's in the study area (map 10).

The towns of Bolton, Huntington, and Buel's Gore were excluded mainly because they have relatively few wetlands, and they are not areas with the types of rapid growth pressure that threaten wetlands (projected numerical changes in population were

low).

Franklin County (5 towns)

Lakeshore communities in Franklin County showed up as problem areas that are located in important parts of the watershed. Swanton, Highgate and Georgia border Lake Champlain and also have a major river on or within their boundaries (map 2 and map 3). St. Albans borders Lake Champlain and Fairfax has a major river that drains into the lake within its boundaries. All of the towns proposed for inclusion in the boundary also have a high number of wetland acres ranging from 1,203 acres to 6,698 acres per town (table 2; map 4). In addition, the percent land area covered by wetland for each town is greater than the state average. The lakeshore communities also show up as problem areas in terms of wetland loss (map 6).

The towns proposed for inclusion have the highest projected numerical increases in population for the county (see map 8). The town of Georgia tops the list with the highest projected population increase (70.3 %) and the greatest projected numerical increase in population (1,982) in the county. All of the proposed towns except Highgate were among the top 10 percent in the state for at least some of the growth measurements in the Growth Areas Research Project Report (Cowart, 1985). Highgate was among the top 25 towns for housing unit growth mentioned in the Guidelines for Growth Report (Healy, 1987).

Grand Isle County

All of the towns in Grand Isle County met both the watershed

and threat considerations for inclusion. The towns are surrounded by Lake Champlain and 17.3 percent of the land area in the county is covered with wetland. Individually, each town is well above the state average (3.7%) for the percent of land area covered by wetlands (table 2). Grand Isle County also has the highest projected population growth for counties in the state (table 7). The towns of Grand Isle and South Hero, the closest to Burlington, have the highest projected population growth in the county with 67.4 percent and 66.4 percent respectively (table 8; map 8). None of the towns showed up on Cowart's (1985) growth indicator lists, but the growth measurements for their study most likely favored larger towns to arrive at the top 25 in the state.

V. RECOMMENDATIONS

A combined AIS/Advance 404(c) project would help provide stronger protection to the wetlands in the Lake Champlain region of Vermont. An Advanced Identification in this area will allow government agencies to focus regulatory efforts on one of the problem areas in the state and will help to reduce the incremental loss of wetlands resulting from rapid growth pressures.

As a result of this study specific recommendations can be made as to how the project should proceed. The specific recommendations are listed below.

1. **AIS**--EPA and the State of Vermont should work towards a cooperative agreement to conduct an AIS in the 26 town area defined in this report.

2. **Advance 404(c)**--Particularly valuable and/or vulnerable sites within the proposed AIS boundary should be identified and protected using Advance 404(c) authorities.

3. **Field Investigation**--A field investigation should be conducted to determine the functions and values of wetlands within the AIS boundary. The proposed field investigation would include two components: 1) a representational analysis of the functions and values of wetlands in the AIS boundary and 2) a detailed study of some of the more important potential advance 404(c) sites.

4. **Public Education Campaign**--One of the most important parts of the AIS action will be the public education campaign. Federal and state agencies should work together to design and implement the public education component of the project.

A timetable for the proposed Advanced Identification is listed below. If timed correctly, the federal and state programs can be complimentary actions. Both government agencies can share

in the responsibilities of and benefit from the information gathering and public education components of the project; and ultimately provide stronger protection to the wetlands resource in a rapid growth region of Vermont.

Timetable for EPA's Proposed Advanced Identification in Vermont

June 30, 1988	Initial meeting with EPA, the State Wetlands Office and the VT Natural Heritage Program.
June-August 1988	Background information gathering in VT to determine the AIS boundary and to develop an action plan for the project.
August 31, 1988	Meeting with the Vermont Department of Environmental Conservation to work out an agreement between the two agencies about the best approach to take for the project and to work out funding for the rest of the project.
December 1988	Finalize agreement between EPA and the state. Begin preliminary work for the field component of the project. Evaluate existing aerial photographs, topographical maps, and National Wetlands Inventory maps.
January-April 1989	Continue preliminary work for field component. Develop methodology for surveying the extent, values and threats to wetlands in the study area. Begin initial field inspections and screening of sites for 404(c) action.
Spring 1989	Prepare a public education plan.
May-July 1989	Continue field investigation and aerial reconnaissance work. Complete compilation of data for Advance Identification action. Field check potential 404(c) sites.
August 15, 1989	Finish report summarizing results of field work.
August-Sept. 1989	Determine boundaries for the Advanced Identification based on information from field studies. Determine suitable and/or unsuitable activities and/or suitable and unsuitable sites.

Timetable (cont'd)

Sept-Dec. 1989	Implement overall public education plan and carry out AIS action (public notice, public hearings and final decision).
January-June 1990	Conduct Advance 404(c) proceedings.

BIBLIOGRAPHY

Barber, E., D.J. Bogucki, G.K. Gruendling, and M. Madden, 1977. Historical Land Use Changes and Impacts in Lake Champlain Wetlands (1941/42, 1962, 1974). Lake Champlain Basin Study No. 3, New England River Basins Commission.

Costle, D.M.(ed.), 1988. Report of the Governor's Commission on Vermont's Future: Guidelines for Growth. 32pp.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe, 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, D.C. FWS/OBS-79/31. 103pp.

Cowart, R., 1985. Vermont's Next Decade of Growth: Development Policies for the 1980's. Report for the Growth Areas Research Project, Vermont Law School. 52pp.

Environmental Protection Agency, 1987. New England's Wetlands, An EPA Strategy for Protection.

Gruendling, G.K., and D.J. Bogucki, 1978. Assessment of the Physical and Biological Characteristics of Major Lake Champlain Wetlands. Lake Champlain Basin Study No. 5, New England River Basins Commission.

Healy, D., 1987. Recent Growth Indicators for Vermont in: Report of the Governor's Commission on Vermont's Future: Guidelines for Growth Supplemental Appendix.

Maine State Planning Office, 1986. The Cumulative Impacts of Development in Southern Maine: Wetlands: Their Locations, Functions, and Value. 69pp.

Osherenko, G., S.T. Kaplan and D. Bradley. 1982. Vermont Wetlands--Laws and Voluntary Techniques for Conservation. Vermont Agency of Environmental Conservation. 160pp.

Parsons, J., 1988. Vermont Recreation Plan Wetlands Component. Report prepared for the Vermont Department of Forests, Parks and Recreation. 39pp.

Tiner, R., 1987. Preliminary National Wetlands Inventory Report on Vermont's Wetland Acreage. U.S. Fish and Wildlife Service, Newton Corner, MA. 5pp.

Tiner, R., 1984. Wetlands of the United States: Current Status and Recent Trends. U.S. Fish and Wildlife Service, National Wetlands Inventory. 59pp.

Vermont Agency of Environmental Conservation, 1982. Vermont Wetlands: Identifying Values and Determining Boundaries. 102pp.

Vermont Department of Health and Vermont State Planning Office, 1983. Vermont Population Projections 1985 - 2000. 39pp.

Vermont Department of Taxes, 1988. Division of Property Valuation and Review Annual Report.

Vermont Natural Resources Council, 1976. Vermont Natural Areas Project (Phase II).

Douse, T., D. Healy, and M. Wilson, 1986. Vermont County Series: An Economic-Demographic Profile of Chittenden County. A Vermont Office of Policy Research and Coordination and Vermont Department of Employment and Training publication. 20pp.

Wanner, R., 1979. Wetlands in Vermont, Their Identification and Protection. Vermont Natural Resources Council, Montpelier, Vermont. 71pp.

Appendix 1. Vermont Wetland Acreage by type based on the U.S. Fish and Wildlife Service's National Wetlands Inventory. Wetlands are classified according to Cowardin et al. (1979). (Note: Totals do not include riverine bars, flats, and streambeds.) From: Tiner (1987).

WETLAND TYPE	ACREAGE
Palustrine Forested Wetland	
PFO1 (Broad-leaved Deciduous)	58,608
PFO2 (Needle-leaved Deciduous)	2,773
PFO4 (Needle-leaved Evergreen)	53,543
PFO5 (Dead)*	5,162
Total PFO	120,086
Palustrine Scrub-Shrub Wetland	
PSS1 (Broad-leaved Deciduous)	60,843
PSS3 (Broad-leaved Evergreen)	2,539
PSS4 (Needle-leaved Evergreen)	716
PSS5 (Dead)*	174
Total PSS	64,272
Palustrine Emergent Wetland	
PEM	24,681
Palustrine Aquatic Bed	
PAB	701
Palustrine Open Water	
POW	8,890
Lacustrine Littoral Open Water**	
L2OW	598
Lacustrine Aquatic Bed	
L2AB	220
Lacustrine Emergent Wetland	
L2EM	22
Riverine Emergent Wetland	
R2EM	174

* Typically the result of beaver activity.
** Excluding littoral zone of Lake Champlain (23,403 acres).

Appendix 2. County wetland acreage for Vermont based on the U.S. Fish and Wildlife Service's National Wetlands Inventory. See Appendix 1 for meaning of wetland type codes. (note: Totals do not include riverine bars, flats, and streambeds.) From: Tiner (1987).

	WETLAND TYPE								
COUNTY	PFO	PSS	PEM	PAB	POW	L2EM	L2AB	L2OW*	COUNTY TOTALS
Addison	17,088	5,801	7,841**	—	877	—	—	32	31,639
Bennington	4,916	4,576	663	106	590	—	38	—	10,889
Caledonia	6,341	3,288	777	37	571	—	—	—	11,014
Chittenden	7,715	4,148	3,828	83	670	13	35	—	16,492
Essex	23,803	8,842	557	27	304	—	—	36	33,569
Franklin	14,796	7,266	3,544	113	598	—	—	—	26,317
Grand Isle	7,345	887	883	1	85	7	—	—	9,208
Lamoille	3,299	3,358	551	57	752	—	—	—	8,017
Orange	2,573	2,831	542	20	635	—	54	—	6,655
Orleans	12,918	6,084	1,087	40	571	—	—	262	20,962
Rutland	11,084	8,096	3,244	69	791	2	5	—	23,291
Washington	2,555	3,394	403	26	692	—	45	—	7,115
Windham	4,005	3,648	592	67	820	—	43	115	9,290
Windsor	1,650	2,054	342	55	934	—	—	154	5,189

* Excluding Lake Champlain littoral zone.
** Includes 174 acres of R2EM.

Appendix 3. Wetland Acreage for towns in Vermont.

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Addison	ADDISON	1,124	31,639
	BRIDPORT	1,845	
	BRISTOL	979	
	CORNWALL	3,484	
	FERRISBURG	3,593	
	GOSHEN	396	
	GRANVILLE	178	
	HANCOCK	57	
	LEICESTER	2,808	
	LINCOLN	606	
	MIDDLEBURY	1,880	
	MONKTON	2,158	
	NEW HAVEN	1,793	
	ORWELL	1,275	
	PANTON	728	
	RIPTON	502	
	SALISBURY	2,911	
	SHOREHAM	1,622	
	STARKSBORO	447	
	VERGENNES	38	
	WALTHAM	169	
	WEYBRIDGE	614	
	WHITING	2,433	

STATE	
AVERAGE WETLAND ACRE/TOWN=	875
MIN. WETLAND ACRE/TOWN=	6
MAX WETLAND ACRE/TOWN=	6,698
TOTAL WETLAND ACRES=	219,647

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Bennington	ARLINGTON	504	10,884
	BENNINGTON	1,123	
	DORSET	787	
	GLASTENBURY	389	
	LANDGROVE	171	
	MANCHESTER	827	
	PERU	396	
	POWNAL	821	
	READSBORO	399	
	RUPERT	286	
	SANDGATE	98	
	SEARSBURG	289	
	SHAFTSBURY	1,228	
	STAMFORD	476	
	SUNDERLAND	1,362	
	WINHALL	585	
	WOODFORD	1,144	

Appendix 3 (cont'd)

County	Town	WETLAND ACRES	COUNTY TOTALS
[illegible]	[illegible]	570	11,014
	[illegible]	819	
	[illegible]VILLE	909	
	[illegible]	850	
	HARDWICK	827	
	KIRBY	207	
	LYNDON	621	
	NEWARK	1,092	
	PEACHAM	987	
	RYEGATE	409	
	SHEFFIELD	267	
	ST. JOHNSBURY	479	
	STANNARD	230	
	SUTTON	1,015	
	WALDEN	856	
	WATERFORD	681	
	WHEELOCK	645	

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Chittenden	BOLTON	184	18,497
	BUELS GORE	8	
	BURLINGTON	658	
	CHARLOTTE	1,247	
	COLCHESTER	1,747	
	ESSEX	1,226	
	HINESBURG	966	
	HUNTINGTON	159	
	JERICHO	863	
	MILTON	3,716	
	RICHMOND	404	
	SHELBURNE	1,241	
	S. BURLINGTON	388	
	ST. GEORGE	70	
	UNDERHILL	773	
	WESTFORD	987	
	WILLISTON	728	
	WINOOSKI	74	

Appendix 3 (cont'd)

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Essex	ALBURG	1,101	11,573
	AVERYS GORE	58	
	BLOOMFIELD	1,510	
	BRIGHTON	3,306	
	BRUNSWICK	2,621	
	CANAAN	1,056	
	CONCORD	1,363	
	EAST HAVEN	343	
	FERDINAND	4,650	
	GRANBY	2,126	
	GUILDHALL	2,023	
	LEMINGTON	1,017	
	LEWIS	4,941	
	LUNENBURG	1,065	
	MAIDSTONE	1,695	
	NORTON	1,262	
	VICTORY	2,848	
	WARNERS GORE	33	
	WARREN GORE	537	

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Franklin	BAKERSFIELD	998	26,219
	BERKSHIRE	988	
	ENOSBURG	878	
	FAIRFAX	1,210	
	FAIRFIELD	1,920	
	FLETCHER	782	
	FRANKLIN	2,687	
	GEORGIA	1,179	
	HIGHGATE	5,317	
	MONTGOMERY	419	
	RICHFORD	426	
	SHELDON	1,149	
	ST. ALBANS	1,726	
	SWANTON	6,698	
Grand Isle	ALBURG	5,109	9,208
	GRAND ISLE	1,096	
	ISLE LA MOTTE	597	
	NORTH HERO	1,529	
	SOUTH HERO	877	

Appendix 3 (cont'd)

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Lamoille	BELVIDERE	997	8,0xx
	CAMBRIDGE	32x	
	EDEN	x,7xx	
	ELMORE	21x	
	HYDE PARK	89x	
	JOHNSON	50x	
	MORRISTOWN	1,07x	
	STOWE	65x	
	WATERVILLE	200	
	WOLCOTT	754	
Orange	BRADFORD	137	6,655
	BRAINTREE	156	
	BROOKFIELD	x88	
	CHELSEA	165	
	CORINTH	668	
	FAIRLEE	144	
	NEWBURY	1,173	
	ORANGE	644	
	RANDOLPH	494	
	STRAFFORD	146	
	THETFORD	535	
	TOPSHAM	375	
	TUNBRIDGE	64	
	VERSHIRE	230	
	WASHINGTON	278	
	WEST FAIRLEE	243	
	WILLIAMSTOWN	514	

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Orleans	ALBANY	1,45x	13,9x5
	BARTON	77x	
	BROWNINGTON	x57	
	CHARLESTON	2,55x	
	COVENTRY	2,38x	
	CRAFTSBURY	1,652	
	DERBY	1,66x	
	GLOVER	534	
	GREENSBORO	815	
	HOLLAND	1,399	
	IRASBURG	1,092	
	JAY	513	
	LOWELL	941	
	MORGAN	1,701	
	NEWPORT	1,241	
	TROY	868	
	WESTFIELD	444	
	WESTMORE	262	

Appendix 3 (cont'd)

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Rutland	BENSON	1,832	13,191
	BRANDON	3,905	
	CASTLETON	1,381	
	CHITTENDEN	392	
	CLAREDON	662	
	DANBY	448	
	FAIR HAVEN	1,053	
	HUBBARDTON	904	
	IRA	89	
	MENDON	124	
	MIDDLETOWN SPR	122	
	MT. HOLLY	788	
	MT. TABOR	1,127	
	PAWLETT	544	
	PITTSFIELD	31	
	PITTSFORD	1,743	
	POULTNEY	635	
	PROCTOR	274	
	RUTLAND	619	
	SHERBURNE	328	
	SHREWSBURY	323	
	SUDBURY	1,275	
	TINMOUTH	1,215	
	WALLINGFORD	797	
	WELLS	581	
	WEST HAVEN	1,264	
	WEST RUTLAND	1,156	

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Washington	BARRE	249	7,113
	BERLIN	479	
	CABOT	690	
	CALAIS	1,051	
	DUXBURY	101	
	E. MONTPELIER	662	
	FAYSTON	58	
	MARSHFIELD	823	
	MIDDLESEX	248	
	MONTPELIER	29	
	MORETOWN	100	
	NORTHFIELD	271	
	PLAINFIELD	162	
	ROXBURY	224	
	WAITSFIELD	103	
	WARREN	140	
	WATERBURY	338	
	WOODBURY	1,112	
	WORCESTER	203	

Appendix 3 (cont'd)

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Windham	ATHENS	75	9,289
	BRATTLEBORO	284	
	BROOKLINE	87	
	DOVER	267	
	DUMMERSTON	128	
	GRAFTON	286	
	GUILFORD	341	
	HALIFAX	484	
	JAMAICA	231	
	LONDONDERRY	401	
	MARLBORO	458	
	NEWFANE	320	
	PUTNEY	280	
	ROCKINGHAM	693	
	SOMERSET	901	
	STRATTON	881	
	TOWNSEND	464	
	VERNON	469	
	WARDSBORO	95	
	WESTMINISTER	495	
	WHITINGHAM	743	
	WILMINGTON	473	
	WINDHAM	329	

TOWN WETLAND ACREAGE County	Town	WETLAND ACRES	COUNTY TOTALS
Windsor	ANDOVER	97	9,190
	BALTIMORE	0	
	BARNARD	207	
	BETHEL	115	
	BRIDGEWATER	60	
	CAVENDISH	331	
	CHESTER	451	
	HARTFORD	206	
	HARTLAND	243	
	LUDLOW	130	
	NORWICH	262	
	PLYMOUTH	267	
	POMFRET	138	
	READING	179	
	ROCHESTER	199	
	ROYALTON	169	
	SHARON	191	
	SPRINGFIELD	457	
	STOCKBRIDGE	55	
	WEATHERSFIELD	710	
	W. WINDSOR	105	
	WESTON	307	
	WINDSOR	128	
	WOODSTOCK	176	

Appendix 4. Wetland loss-related projects reviewed by the state Wetlands Office from 1986 through mid-August 1988. Totals for towns and counties have been included.

County	Town	1986	1987	1988	TOTAL	COUNTY TOTAL
Addison	ADDISON	1			1	14
	BRISTOL					
	CORNWALL	2			2	
	FERRISBURG	1	1	1	3	
	GOSHEN					
	GRANVILLE					
	HANCOCK					
	LEICESTER					
	LINCOLN			1	1	
	MIDDLEBURY	2		2	4	
	MONKTON					
	NEW HAVEN					
	ORWELL					
	PANTON					
	RIPTON					
	SALISBURY					
	SHOREHAM		1		1	
	STARKSBORO					
	VERGENNES	1	1		2	
	WALTHAM					
	WEYBRIDGE					
	WHITING					
Bennington	ARLINGTON	1	1	1	3	46
	BENNINGTON	1	4		5	
	DORSET	1	3		4	
	GLASTENBURY					
	LANDGROVE					
	MANCHESTER	6	4	6	16	
	PERU					
	POWNAL	2	2	3	7	
	READSBORO					
	RUPERT					
	SANDGATE					
	SEARSBURG	1	1		2	
	SHAFTSBURY		1	2	3	
	STAMFORD			1	1	
	SUNDERLAND	1	3	1	5	
	WINHALL					
	WOODFORD					
Caledonia	BARNET					11
	BURKE					
	DANVILLE		1		1	
	GROTON					
	HARDWICK		1	1	2	
	KIRBY					
	LYNDON					
	NEWARK		1		1	
	PEACHAM					
	RYEGATE		1		1	
	SHEFFIELD					
	ST. JOHNSBURY	2	2		4	
	STANNARD					
	SUTTON					
	WALDEN			1	1	
	WATERFORD		1		1	
	WHEELOCK					

Appendix 4 (cont'd)

LOGS RELATED SITE VISITS BY STATE WETLANDS STAFF

County	Town	1986	1987	1988	TOTAL	COUNTY TOTAL
Chittenden	BOLTON		1		1	135
	BUELS GORE					
	BURLINGTON	6	5	4	15	
	CHARLOTTE	2	3	3	8	
	COLCHESTER	5	6	6	17	
	ESSEX	3	6	6	15	
	HINESBURG		1		1	
	HUNTINGTON	1	2	2	5	
	JERICHO	1	2		3	
	MILTON	4	3	2	9	
	RICHMOND		3	1	4	
	SHELBURNE	3	1	4	8	
	S. BURLINGTON	5	4	1	10	
	ST. GEORGE					
	UNDERHILL	1	3		4	
	WESTFORD		1	1	2	
	WILLISTON	14	8	12	34	
Essex	AVERILL					11
	AVERYS GORE					
	BLOOMFIELD					
	BRIGHTON	3	3	1	7	
	BRUNSWICK			1	1	
	CANAAN					
	CONCORD			2	2	
	EAST HAVEN					
	FERDINAND					
	GRANBY					
	GUILDHALL			1	1	
	LEMINGTON					
	LEWIS					
	LUNENBURG					
	MAIDSTONE					
	NORTON					
	VICTORY					
	WARNERS GORE					
	WARREN GORE					
Franklin	BAKERSFIELD	1		1	2	32
	BERKSHIRE					
	ENOSBURG			1	1	
	FAIRFAX	1	1	1	3	
	FAIRFIELD					
	FLETCHER					
	FRANKLIN	1			1	
	GEORGIA	1	3		4	
	HIGHGATE	1	1	5	7	
	MONTGOMERY					
	RICHFORD		2		2	
	SHELDON	1		1	2	
	ST. ALBANS	4	3	2	9	
	SWANTON		1		1	
Grand Isle	ALBURG	2	2	3	7	15
	GRAND ISLE		1	1	2	
	ISLE LA MOTTE		1		1	
	NORTH HERO	2	1	1	4	
	SOUTH HERO			1	1	

Appendix 4 (cont'd)

1988 RELATED SITE VISITS BY STATE WETLANDS STAFF

County	Town	1986	1987	1988	TOTAL	COUNTY TOTAL
Lamoille	BELVIDERE					27
	CAMBRIDGE			1	1	
	EDEN			1	1	
	ELMORE			1	1	
	HYDE PARK		1	3	4	
	JOHNSON					
	MORRISTOWN	3			3	
	STOWE	4	6	3	13	
	WATERVILLE					
	WOLCOTT					
Orange	BRADFORD					6
	BRAINTREE					
	BROOKFIELD					
	CHELSEA					
	CORINTH					
	FAIRLEE		1		1	
	NEWBURY	1		1	2	
	ORANGE					
	RANDOLPH			1	1	
	STRAFFORD					
	THETFORD					
	TOPSHAM	1			1	
	TUNBRIDGE					
	VERSHIRE					
	WASHINGTON					
	WEST FAIRLEE					
	WILLIAMSTOWN		1		1	
Orleans	ALBANY					29
	BARTON		1		1	
	BRISTOL			1	1	
	BROWNINGTON					
	CHARLESTON	1	1	1	3	
	COVENTRY	2		1	3	
	CRAFTSBURY					
	DERBY			1	1	
	GLOVER					
	GREENSBORO					
	HOLLAND	1			1	
	IRASBURG	1	1	1	3	
	JAY					
	LOWELL		1		1	
	MORGAN					
	NEWPORT	3	8	2	13	
	TROY	1	1		2	
	WESTFIELD					
	WESTMORE					

Appendix 4 (cont'd)

LOSS RELATED SITE VISITS BY STATE WETLANDS STAFF

County	Town	1986	1987	1988	TOTAL	COUNTY TOTAL
Rutland	BENSON		1	1	2	77
	BRANDON		2	1	3	
	CASTLETON		3	6	9	
	CHITTENDEN					
	CLAREDON	1	1		2	
	DANBY			1	1	
	FAIR HAVEN					
	HUBBARDTON	1	1		2	
	IRA					
	MENDON	2	2		4	
	MIDDLETOWN SPRINGS					
	MT. HOLLY		1		1	
	MT. TABOR					
	PAWLETT					
	PITTSFIELD					
	PITTSFORD		3		3	
	POULTNEY	2	1	1	4	
	PROCTOR	2			2	
	RUTLAND	7	10	4	21	
	SHERBURNE	2	3	1	6	
	SHREWSBURY					
	SUDBURY					
	TINMOUTH					
	WALLINGFORD	2	1	2	5	
	WELLS	1	1	1	3	
	WEST HAVEN					
	WEST RUTLAND	2	2	1	5	
Washington	BARRE	2	4	3	9	39
	BERLIN	3	4	4	11	
	CABOT	1	2		3	
	CALAIS		1	1	2	
	DUXBURY					
	E. MONTPELIER	2		1	3	
	FAYSTON			1	1	
	MARSHFIELD					
	MIDDLESEX			1	1	
	MONTPELIER					
	MORETOWN					
	NORTHFIELD		1		1	
	PLAINFIELD					
	ROXBURY			1	1	
	WAITSFIELD		1		1	
	WARREN					
	WATERBURY	1	3	2	6	
	WOODBURY					
	WORCESTER					

Appendix 4 (cont'd)

LOSS RELATED SITE VISITS BY STATE WETLANDS STAFF

County	Town	1986	1987	1988	TOTAL	COUNTY TOTAL
Windham	ATHENS					47
	BRATTLEBORO	[illegible]	2	3	7	
	BROOKLINE					
	DOVER	3	4	2	9	
	DUMMERSTON					
	GRAFTON		1		1	
	GUILFORD	1	3		4	
	HALIFAX			1	1	
	JAMAICA		1	1	2	
	LONDONDERRY	3	5		8	
	MARLBORO					
	NEWFANE	1		3	4	
	PUTNEY					
	ROCKINGHAM					
	SOMERSET					
	STRATTON	1	1		2	
	TOWNSEND			1	1	
	VERNON	1	2	1	4	
	WARDSBORO					
	WESTMINISTER	2			2	
	WHITINGHAM					
	WILMINGTON			1	1	
	WINDHAM	1			1	
Windsor	ANDOVER					23
	BALTIMORE					
	BARNARD					
	BETHEL					
	BRIDGEWATER					
	CAVENDISH	1			1	
	CHESTER					
	HARTFORD	1	2	2	5	
	HARTLAND	2		1	3	
	LUDLOW		1		1	
	NORWICH		1	2	3	
	PLYMOUTH	1	1		2	
	POMFRET					
	READING					
	ROCHESTER					
	ROYALTON					
	SHARON					
	SPRINGFIELD					
	STOCKBRIDGE					
	WEATHERSFIELD					
	W. WINDSOR	1			1	
	WESTON			1	1	
	WINDSOR	1	2		3	
	WOODSTOCK	1	2		3	